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PRICES OF FERTILIZER MATERIALS AND FACTORS AFFECTING THE FERTILIZER TONNAGE

A THESIS

PRESENTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF CORNELL UNIVERSITY IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

BY

EDMUND ELLSWORTH VIAL

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PRICES OF FERTILIZER MATERIALS, AND FACTORS AFFECTING THE FERTILIZER TONNAGE

EDMUND ELLSWORTH VIAL

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PRICES OF FERTILIZER MATERIALS, AND FACTORS AFFECTING THE FERTILIZER TONNAGE[1]

EDMUND ELLSWORTH VIAL

For many years farmers have found it profitable to apply materials which contain plant nutrients to the land. The demand for such materials has led to the world-wide exploitation of mineral deposits that contain the plant nutrients in most readily available form, to the mixing of various fertilizer ingredients, and to the development of the commercial-fertilizer industry.

The three chemical elements, phosphorus, nitrogen, and potassium, are the important elements considered in the manufacture and sale of commercial fertilizer. Materials containing these elements in various chemical combinations are known as fertilizer raw materials. These raw materials are obtained from natural deposits and from by-products of industrial and manufacturing enterprises. A few are manufactured synthetically.

The availability, concentration, and stability of the plant food in these materials vary. Mechanical and chemical treatment are often necessary to make the plant nutrients available. Mechanical treatment is primarily grinding, while chemical treatment of fertilizer materials consists largely in treating the materials with sulfuric acid to increase their solubility. The concentration of the plant food is often increased by various processes.

The plant foods in commercial fertilizer are known to the trade as phosphoric acid (P_2O_5), ammonia (NH_3), and potash (K_2O). The phosphoric acid influences the fruiting and the seed production of the plant, the ammonia the leaf growth, and the potassium the formation of starch, sugar, and cellulose. Materials used for fertilizing purposes contain one or more of these plant nutrients.

In some sections of the country much more fertilizer is used than in other sections. The type and character of the soil, climatic conditions, prices of fertilizer, and prices of farm crops, are factors which influence fertilizer consumption. Changes in these factors cause changes in the fertilizer tonnage.

The demand for fertilizer and the prices of fertilizer raw materials are important economic factors which affect the status of the fertilizer industry. The present study includes (1) fertilizer materials, their production and prices; (2) fertilizer manufacturing; and (3) factors affecting fertilizer consumption.

[1] Also presented to the Faculty of the Graduate School of Cornell University, April, 1927, as a major thesis in partial fulfillment of the requirements for the degree of doctor of philosophy.

AUTHOR'S ACKNOWLEDGMENTS. This study was made under a fellowship established in the Graduate School of Cornell University by the Potash Importing Corporation of America on November 18, 1925. In May, 1927, the importing of potash into the United States was taken over by the N. V. Potash Export MY of Amsterdam, Holland. The writer wishes to express his appreciation to George J. Callister, of that company, for tabulating the monthly prices of nineteen fertilizer materials and for many valuable suggestions and criticisms. The writer is indebted also to Professor F. A. Pearson, of the Department of Agricultural Economics and Farm Management at Cornell University.

FERTILIZER MATERIALS

PHOSPHATES

Rock phosphate

Production

Phosphate rock is the most important source of phosphorus in commercial fertilizers. The known deposits of this rock are distributed principally in four localities — along the west coast of Florida, along the coast of South Carolina, in central Tennessee, and in an area composed of southeastern Idaho, southwestern Wyoming, and northeastern Utah. There are deposits of relatively low-grade rock in Arkansas, North Carolina, Alabama, Mississippi, and Nevada. The mining of phosphate rock on a commercial scale has been confined to those deposits that are near the

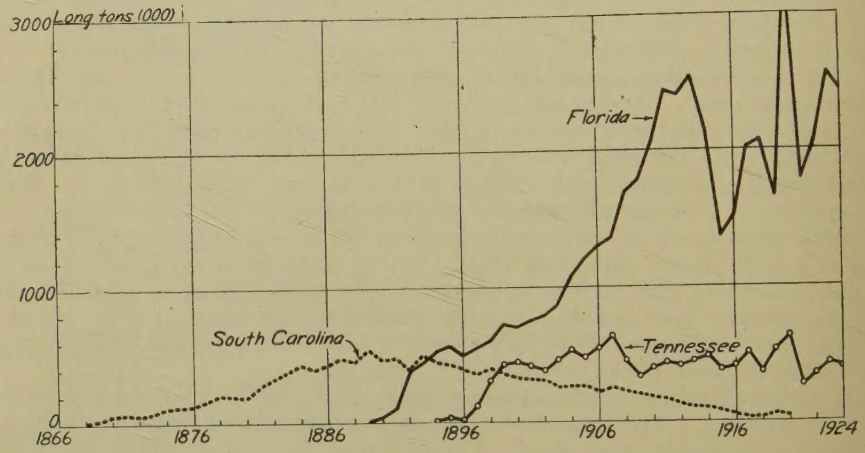

FIGURE 1. PRODUCTION OF PHOSPHATE ROCK IN FLORIDA, TENNESSEE, AND SOUTH CAROLINA, 1868 TO 1924

Florida is the leading State in the production of phosphate rock. Tennessee and South Carolina are of minor importance

regions where fertilizer consumption is large and where the costs of mining a good grade of rock are relatively low.

The first discovery of phosphate rock in the United States was in South Carolina in 1867. Six tons was marketed in that year. Production increased steadily from the beginning until 1889, when it reached its maximum of nearly 542,000 tons (table 1 and figure 1). Since then the South Carolina production has declined, due to competition from Florida and Tennessee.

TABLE 1. SALES OF PHOSPHATE ROCK, BY STATES AND FOR THE UNITED STATES, 1867 TO 1926

Year	Sales, in long tons			
	South Carolina	Florida	Tennessee	United States
1867	6	.....	.....	6
1868	12,262	.....	.....	12,262
1869	31,958	.....	.....	31,958
1870	65,241	.....	.....	65,241
1871	74,188	.....	.....	74,188
1872	58,760	.....	.....	58,760
1873	79,203	.....	.....	79,203
1874	109,340	.....	.....	109,340
1875	122,790	.....	.....	122,790
1876	132,478	.....	.....	132,478
1877	163,000	.....	.....	163,000
1878	210,322	.....	.....	210,322
1879	199,365	.....	.....	199,365
1880	190,763	.....	.....	190,763
1881	266,734	.....	.....	266,734
1882	332,077	.....	.....	332,077
1883	378,380	.....	.....	378,380
1884	431,779	.....	.....	431,779
1885	395,403	.....	.....	395,403
1886	430,549	.....	.....	430,549
1887	480,558	.....	.....	480,558
1888	448,567	3,000	.....	451,567
1889	541,645	4,100	.....	545,745
1890	463,998	46,501	.....	510,499
1891	475,506	112,482	.....	587,988
1892	394,228	287,343	.....	681,571
1893	502,564	438,804	.....	941,368
1894	450,108	527,653	19,188	996,949
1895	431,975	568,061	38,515	1,038,551
1896	402,423	495,199	26,157	930,779
1897	358,280	552,342	128,723	1,039,345
1898	399,804	600,894	308,107	1,308,885
1899	356,650	726,420	430,192	1,515,702
1900	329,173	706,243	454,491	1,491,216
1901	321,181	751,996	409,653	1,483,723
1902	313,365	785,430	390,799	1,490,314
1903	258,540	860,336	460,530	1,581,576
1904	270,806	1,072,951	530,571	1,874,428
1905	270,225	1,194,106	482,859	1,947,190
1906	223,675	1,304,505	547,677	2,080,957
1907	257,221	1,357,365	638,612	2,265,343
1908	225,495	1,692,102	455,431	2,386,138
1909	207,954	1,779,702	341,115	2,338,264
1910	179,659	2,067,507	398,188	2,654,988
1911	169,156	2,436,248	437,370	3,053,279
1912	131,490	2,406,899	423,331	2,973,332
1913	109,333	2,545,276	451,559	3,111,221
1914	106,919	2,138,891	483,203	2,734,043

TABLE 1 (*concluded*)

Year	Sales, in long tons			
	South Carolina	Florida	Tennessee	United States
1915	83,460	1,358,611	389,759	1,835,667
1916	53,047	1,515,845	411,790	1,982,385
1917	33,485	2,022,599	513,107	2,584,287
1918	37,040	2,067,230	374,535	2,490,760
1919	60,823	1,660,200	534,025	2,271,983
1920	44,141	3,369,384	634,848	4,103,982
1921	.....	1,780,028	277,706	2,064,025
1922	1,500	2,058,593	353,309	2,417,883
1923	.....	2,547,653	428,718	3,006,706
1924	.....	2,432,581	396,638	2,867,789
1925	2,147	2,929,964	477,077	3,481,819
1926	.....	2,708,207	464,192	3,209,976

The South Carolina deposits occur in two forms: land rock, containing 58 per cent of tricalcium phosphate; and river rock, containing 55 per cent. The latter is mined from the river channels.

The year 1887 marked the beginning of the phosphate industry in Florida. The first shipment of pebble phosphate from Peace River was made to Atlanta, Georgia, in 1888. During the following two years hard-rock phosphate was discovered in Marion County, and the land-pebble area was opened in Polk County. The sales of Florida phosphate rock increased rapidly and almost without interruption from 1888 until the beginning of the World War in 1914 (figure 1). Sales during the period from 1915 to 1919 were only 74 per cent of those for the five years 1910 to 1914. Sales have fluctuated violently from year to year since 1914.

The Florida deposits are of three classes: hard rock, containing from 78 to 80 per cent of tricalcium phosphate; land pebble, with from 68 to 70 per cent; and river pebble, with about 65 per cent. The Florida deposits contain a higher percentage of tricalcium phosphate than do the South Carolina deposits. This was one of the factors which enabled the Florida rock to displace the South Carolina rock in the fertilizer trade.

Since 1910 the Florida production has been primarily land pebble. Land pebble is a soft rock used in domestic consumption. It is more easily ground than the hard rock. Hard rock, which contains a higher percentage of tricalcium phosphate than does the land pebble, is exported.

While the phosphate mines in South Carolina are nearer the center of fertilizer consumption, the Florida area has the advantages of a higher grade of phosphate rock and cheaper methods of mining. These factors, with the cheap water transportation to the fertilizer-manufacturing centers along the Atlantic Coast, enable the Florida mines to compete successfully with the mines nearer the manufacturing centers.

Phosphate-rock mining in Tennessee began in 1894. The maximum production, 638,612 long tons, was reached in 1907. Since then, the trend has been slightly downward (figure 1). For the five years 1920 to 1924, the Tennessee production has averaged about 15 per cent of the United States total.

The Tennessee deposits are: a brown rock, containing from 70 to 80 per cent of lime phosphate; a white rock, containing from 75 to 85 per cent of lime phosphate; and some blue rock. The brown rock makes up the major part of the tonnage.

The Tennessee phosphate rock is sold largely in the Mississippi Valley. This region uses a relatively small amount of the total fertilizer tonnage in the United States. Transportation costs prevent the Tennessee mines from competing successfully with the Florida mines in the fertilizer-consuming areas along the Atlantic seaboard.

A large area of phosphate-bearing rock has been located in the northwestern part of the United States. High transportation costs to consuming sections and lack of local demand have retarded its development.

The production of phosphate rock in each State, expressed in percentage of the total United States production, for the years 1867 to 1926 is shown in table 2. For the twenty-one years 1867 to 1887, the mining of phosphate rock was confined to South Carolina. In 1899 Tennessee became relatively more important than South Carolina (figure 2). Since the early nineties Florida has been the leading State in phosphate-rock

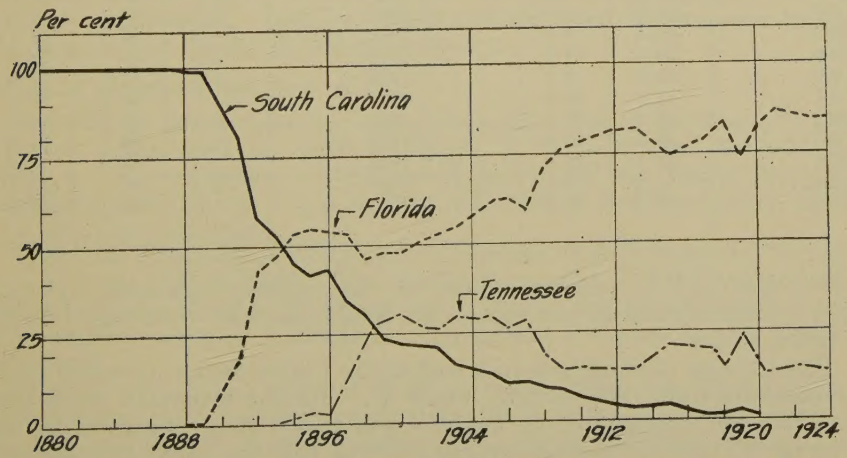

FIGURE 2. PERCENTAGE OF UNITED STATES PHOSPHATE-ROCK PRODUCTION FROM SOUTH CAROLINA, FLORIDA, AND TENNESSEE, 1880 TO 1924

Prior to 1888, phosphate-rock mining was confined to South Carolina. At the present time, Florida produces about 85 per cent of the phosphate rock produced in the United States, and Tennessee about 15 per cent

TABLE 2. PERCENTAGE OF UNITED STATES PRODUCTION OF PHOSPHATE ROCK IN SOUTH CAROLINA, FLORIDA, AND TENNESSEE, 1867 TO 1926

Year	Per cent produced in			Year	Per cent produced in		
	South Carolina	Florida	Tennessee		South Carolina	Florida	Tennessee
1867	100.0	.....	.....	1897	34.5	53.1	12.4
1868	100.0	.....	.....	1898	30.6	45.9	23.5
1869	100.0	.....	.....	1899	23.5	47.9	28.4
1870	100.0	.....	.....	1900	22.1	47.4	30.4
1871	100.0	.....	.....	1901	21.6	50.7	27.6
1872	100.0	.....	.....	1902	21.0	52.7	26.2
1873	100.0	.....	.....	1903	16.4	54.4	29.1
1874	100.0	.....	.....	1904	14.5	57.3	28.3
1875	100.0	.....	.....	1905	13.9	61.3	24.8
1876	100.0	.....	.....	1906	10.8	62.7	26.3
1877	100.0	.....	.....	1907	11.3	59.9	28.2
1878	100.0	.....	.....	1908	9.4	70.9	19.1
1879	100.0	.....	.....	1909	8.9	76.1	14.6
1880	100.0	.....	.....	1910	6.8	77.9	15.0
1881	100.0	.....	.....	1911	5.5	79.8	14.3
1882	100.0	.....	.....	1912	4.4	81.0	14.2
1883	100.0	.....	.....	1913	3.5	81.8	14.5
1884	100.0	.....	.....	1914	3.9	78.2	17.7
1885	100.0	.....	.....	1915	4.5	74.0	21.2
1886	100.0	.....	.....	1916	2.7	76.5	20.8
1887	100.0	.....	.....	1917	1.3	78.3	19.9
1888	99.3	0.7	.....	1918	1.5	83.0	15.1
1889	99.3	0.7	.....	1919	2.7	73.1	23.5
1890	91.0	9.2	.....	1920	1.1	82.1	15.5
1891	81.0	19.0	.....	1921	.....	86.2	13.5
1892	57.8	42.1	.....	1922	0.1	85.2	14.6
1893	53.5	46.7	.....	1923	.....	84.7	14.3
1894	45.1	53.0	1.9	1924	.....	84.8	13.8
1895	41.6	54.7	3.8	1925	0.1	84.2	13.7
1896	43.2	53.2	2.8	1926	.....	84.4	14.5

production and its relative importance has steadily increased. Florida now produces about 85 per cent of the total phosphate rock mined in the United States.

The tonnage of phosphate rock sold in the United States increased fairly consistently from 1867 to 1913 (figure 3). For the seventeen years 1880 to 1896, the average annual increase was 48,000 tons. Considering the average tonnage for these seventeen years as 100, the yearly increase was 8.6 per cent. During the following seventeen years the average annual increase was 125,000 tons, or 6.1 per cent of the average. During the second period the percentage increase was less than during the first period, even though the tonnage increase was greater.

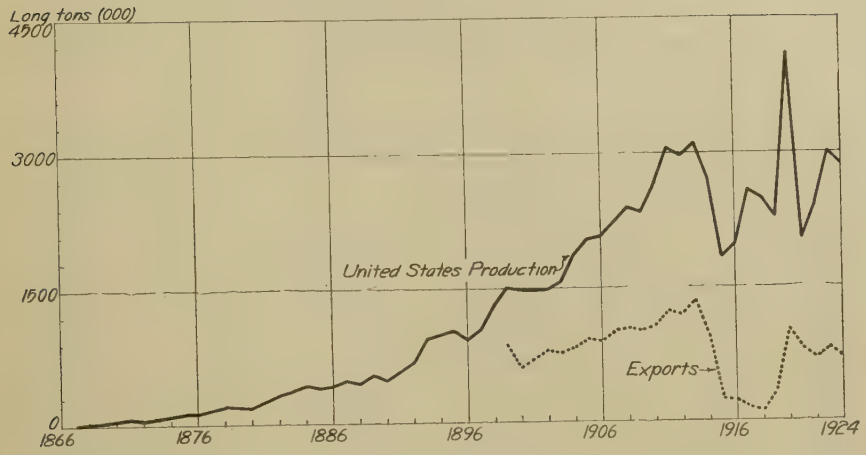

FIGURE 3. PHOSPHATE-ROCK PRODUCTION IN THE UNITED STATES, 1867 TO 1924, AND EXPORTS OF PHOSPHATE ROCK, 1899 TO 1924

Phosphate-rock production increased consistently from 1867 to 1913. Since then there have been large fluctuations in production. Exports were low during the war and post-war periods

Sales of phosphate rock were lower during the five years 1915 to 1919 than during the five years 1910 to 1914. During the war, shipments to Germany almost ceased and shipments to other foreign countries were seriously interrupted. Lack of vessels and increased freight rates had a depressing effect on the phosphate industry.

Prices of phosphate rock f.o.b. mines

The average yearly price per ton of phosphate rock at the mines for the forty-six years 1881 to 1926 is shown in table 3, and to 1924 in figure 4. A comparison of the yearly prices and the yearly sales of phosphate rock (figures 4 and 3) shows that prices fluctuated much more violently than did sales.

There was a decided downward trend in prices of phosphate rock for the sixteen years 1881 to 1896. The decline from 1881 to 1887 was violent. Prices fell from $7.42 to $3.82 per ton. During these seven years there were improvements in methods of mining, and a decline in the general price level.

Prices recovered, and stood at $6.30 per ton in 1890. The reports of the United States Geological Survey attribute the recovery to a greater foreign demand, especially in England, and to good crops in the United States, the latter having a tendency to increase the demand for fertilizers.

Following the discovery of phosphate rock in Florida in 1888, prices of phosphate rock declined rapidly. In 1890 the price per ton was $6.30, in 1897 it was $2.57. This decline caused marked readjustments in the

TABLE 3. PRICES OF PHOSPHATE ROCK PER LONG TON AT MINES, 1881 TO 1926*

Year	Prices per long ton			
	South Carolina	Florida	Tennessee	United States
1881	$7.42	....	....	$7.42
1882	6.00	....	....	6.00
1883	6.00	....	....	6.00
1884	5.50	....	....	5.50
1885	5.92	....	....	6.16
1886	4.29	....	....	4.29
1887	3.82	....	....	3.82
1888	4.50	$7.00	....	4.52
1889	5.34	6.83	....	5.35
1890	6.20	7.27	....	6.30
1891	6.20	6.25	....	6.21
1892	4.76	4.94	....	4.84
1893	4.29	4.51	....	4.39
1894	3.88	3.16	$3.50	3.49
1895	3.27	3.72	2.13	3.47
1896	2.94	3.12	2.19	3.01
1897	2.75	2.70	1.50	2.57
1898	2.77	3.08	1.62	2.64
1899	3.02	3.86	2.77	3.35
1900	3.17	4.22	2.92	3.59
1901	2.99	4.20	2.91	3.58
1902	2.93	3.26	3.09	3.15
1903	3.03	3.47	3.35	3.35
1904	3.18	3.70	3.29	3.51
1905	3.25	3.56	3.38	3.47
1906	3.65	4.28	3.92	4.12
1907	3.81	4.85	4.77	4.70
1908	4.39	5.01	4.12	4.78
1909	4.38	4.80	3.86	4.62
1910	4.08	4.18	3.78	4.11
1911	3.98	3.89	3.92	3.90
1912	3.99	3.93	3.88	3.93
1913	4.03	3.76	3.93	3.79
1914	3.88	3.44	3.77	3.51
1915	3.72	2.77	3.41	2.95
1916	3.98	2.75	3.67	2.97
1917	4.14	2.70	4.14	3.01
1918	4.45	2.95	5.12	3.30
1919	5.08	4.70	6.39	5.10
1920	8.32	5.78	7.79	6.11
1921	....	5.86	6.53	5.94
1922	5.50	4.05	5.96	4.34
1923	....	3.56	5.46	3.85
1924	....	3.30	5.14	3.57
1925	3.75	3.00	5.09	3.32
1926	....	3.21	4.41	3.39

* From annual reports of the United States Geological Survey.

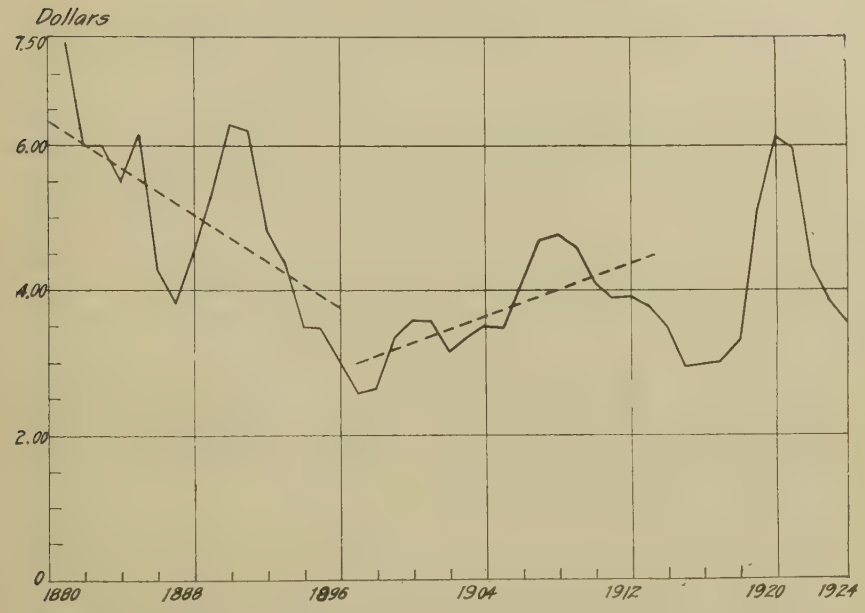

FIGURE 4. VALUE OF PHOSPHATE ROCK PER LONG TON AT MINES, 1881 TO 1924

Prices of phosphate rock have been subject to violent fluctuations. With the deflation of 1920, prices declined to about the pre-war level. The broken line indicates the trend

industry. The Geological Survey states that of the 252 corporations or individuals who organized to engage in high-grade phosphate mining in Florida during the eight years 1890 to 1897, only 28 were actively operating mines in 1898.

For the seventeen years 1897 to 1913, there was a very slight upward trend in the price of phosphate rock. The average annual increase was 9 cents per ton.

Prior to and during the war, prices of phosphate rock were relatively low. They increased during the post-war inflation, and with deflation declined to about pre-war levels.

The value of phosphate rock at the mines in South Carolina, Florida, and Tennessee for the forty-four years 1881 to 1924 is shown by figure 5. In general, the prices move together. For the fourteen years 1897 to 1910, Florida rock was consistently the highest in price. From 1913 to 1924, Florida rock was consistently the lowest in price. During the World War there was a scarcity of shipping facilities, and ocean freight rates rose rapidly. Since the war, transportation charges have remained relatively high. This has tended to increase the price differential between various sections, making prices relatively lower in the surplus regions farthest from the consuming center.

TABLE 4. PRICES OF TENNESSEE PHOSPHATE ROCK, 75 PER CENT CALCIUM PHOSPHATE, F. O. B. MINES, 1901 TO 1928*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88	$ 4.88
1901	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
1902	3.25	3.72	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.81
1903	3.88	4.34	3.88	3.68	3.50	3.50	3.50	3.50	3.50	3.50	3.90	4.00	3.72
1904	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.80	3.75	3.75	3.75	3.75	3.90
1905	3.75	3.75	3.75	3.76	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.77
1906	3.78	3.78	.....	.....	.....	.....	.....	.....	.....	4.62	4.62	4.62	4.45
1907	4.62	4.62	4.62	5.82	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.12	5.72
1908	6.12	5.94	4.58	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	5.05
1909	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1910	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1911	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1912	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1913	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1914	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1915	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1916	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1917	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	5.09	5.75	4.97
1918	5.75	5.75	5.75	5.75	5.75	5.75	6.50	7.75	7.75	7.75	7.75	7.75	6.65
1919	8.25	9.75	9.60	9.25	9.25	9.10	8.88	9.22	10.20	10.00	10.00	10.00	9.46
1920	10.00	10.00	10.00	10.00	10.00	10.75	11.50	11.50	11.50	11.50	11.50	11.50	10.81
1921	11.50	11.50	11.50	8.50	7.50	8.00	8.00	8.00	8.00	8.00	7.25	7.00	8.73
1922	7.00	7.00	6.25	5.50	5.50	6.50	7.50	7.50	7.50	7.50	7.50	7.50	6.90
1923	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
1924	7.50	6.75	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.60
1925	6.50	6.50	6.50	6.50	6.38	6.00	6.00	6.00	6.00	6.00	6.00	5.50	6.16
1926	6.00	5.88	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.57
1927	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
1928	5.50	5.50	5.50	5.50	5.50	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of Tennessee phosphate rock, 75 per cent calcium phosphate, were obtained from the *Oil, Paint and Drug Reporter*. For the period from January, 1901, to December, 1904, no percentage was given. For the year 1905 the quotations were for domestic, with no percentage given. For the period from October, 1907, to May, 1928, the quotations were for Tennessee phosphate rock, 75 per cent calcium phosphate. Prices here given are assumed to be comparable with prices on 75-per-cent Tennessee phosphate rock.

TABLE 5. INDEX NUMBERS OF PRICES OF TENNESSEE PHOSPHATE ROCK, 75 PER CENT CALCIUM PHOSPHATE, F. O. B. MINES, 1901 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1901	67	67	67	67	67	67	67	67	67	67	67	67	67
1902	67	76	80	80	80	80	80	80	80	80	80	80	78
1903	80	89	80	75	72	72	72	72	72	72	80	82	76
1904	82	82	82	82	82	82	82	78	77	77	77	77	80
1905	77	77	77	77	77	77	77	77	77	77	77	77	77
1906	77	77	90	95	95	95	...	95	95	95	95	95	91
1907	95	95	95	119	125	125	125	125	125	125	125	125	117
1908	125	122	94	100	100	100	100	100	100	100	100	100	103
1909	100	100	100	100	100	100	100	100	100	100	100	100	100
1910	100	100	100	100	100	100	100	100	100	100	100	100	100
1911	100	100	100	100	100	100	100	100	100	100	100	100	100
1912	100	100	100	100	100	100	100	100	100	100	100	100	100
1913	100	100	100	100	100	100	100	100	100	100	100	100	100
1914	100	100	100	100	100	100	100	100	100	100	100	100	100
1915	100	100	100	100	100	100	100	100	100	100	100	100	100
1916	100	100	100	100	100	100	100	100	100	100	100	100	100
1917	100	100	100	100	100	100	100	100	100	100	104	118	102
1918	118	118	118	118	118	118	133	159	159	159	159	159	136
1919	169	200	197	190	190	186	182	189	209	205	205	205	194
1920	205	205	205	205	205	220	236	236	236	236	236	236	222
1921	236	236	236	174	154	164	164	164	164	164	149	143	179
1922	143	143	128	113	113	133	154	154	154	154	154	154	141
1923	154	154	154	154	154	154	154	154	154	154	154	154	154
1924	154	138	133	133	133	133	133	133	133	133	133	133	135
1925	133	133	133	133	131	123	123	123	123	123	123	113	126
1926	123	120	113	113	113	113	113	113	113	113	113	113	114
1927	113	113	113	113	113	113	113	113	113	113	113	113	113
1928	113	113	113	113	113	...	...	...	...	...	...	...	...

TABLE 6. PRICES OF FLORIDA LAND PEBBLE, 68 PER CENT CALCIUM PHOSPHATE, F. O. B. MINES, 1904 TO 1928*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$3.68	$3.72	$3.72	$3.68	$3.68	$3.68	$ 3.61	$ 3.47	$ 3.48	$ 3.51	$ 3.52	$3.52	$3.61
1904	4.50	4.50	4.50	4.50	4.20	4.12	4.12	3.92	3.88	3.88	3.88	3.88	4.16
1905	3.88	3.88	3.88	4.06	4.12	4.12	4.12	4.12	4.12	4.12	4.12	4.12	4.06
1906	4.12	4.12	4.12	4.42	4.62	4.62	4.62	4.62	4.62	5.32	5.88	5.88	4.75
1907	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88	8.38	8.38	7.62	7.62	6.58
1908	6.94	5.38	4.35	4.00	4.12	4.12	4.12	3.90	3.56	3.38	3.42	3.62	4.24
1909	3.69	3.94	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.69	3.85
1910	3.92	4.08	4.08	3.92	3.88	3.88	3.69	3.62	3.68	3.80	3.88	3.88	3.86
1911	3.88	3.88	3.88	3.88	3.88	3.88	3.72	3.73	3.75	3.75	3.75	3.75	3.81
1912	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
1913	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.12	3.12	3.12	3.12	3.12	3.49
1914	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12
1915	3.12	3.12	3.12	3.12	3.12	3.12	3.00	2.88	2.88	2.88	2.88	2.88	3.01
1916	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.50	2.84
1917	2.12	2.12	2.12	2.12	2.12	2.12	2.77	3.20	3.20	3.20	3.20	3.38	2.64
1918	3.38	3.38	3.62	3.62	3.62	3.72	4.15	5.00	5.00	5.00	5.00	5.00	4.21
1919	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	.....	.....	.....	.....	5.00
1920	.....	6.85	6.85	6.85	6.85	8.55	11.25	11.25	11.19	11.31	11.05	9.25	9.20
1921	9.25	9.25	8.25	5.25	5.25	5.50	5.50	5.50	5.50	5.30	4.28	3.25	6.01
1922	3.25	3.25	3.22	3.25	3.25	3.25	3.25	3.25	2.88	2.88	2.88	2.88	3.12
1923	2.62	2.91	3.00	3.00	3.00	3.00	3.15	3.25	3.25	3.25	3.25	3.25	3.08
1924	3.25	2.50	2.25	2.25	2.25	2.25	2.25	2.20	2.15	2.15	2.15	2.11	2.31
1925	2.10	2.10	2.10	2.10	2.20	2.50	2.58	2.65	2.65	2.65	2.85	2.85	2.44
1926	2.98	3.12	3.25	3.21	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.18
1927	3.18	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.09
1928	3.08	3.08	3.08	3.08	3.08	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of Florida land pebble were obtained from the *Oil, Paint and Drug Reporter*. For the period from January, 1904, to April, 1908, no percentage was given. For the period from May, 1908, to May, 1928, the percentage of calcium phosphate was given as 68. Prices here given are assumed to be comparable with prices of 68-per-cent Florida land pebble.

TABLE 7. INDEX NUMBERS OF PRICES OF FLORIDA LAND PEBBLE, 68 PER CENT CALCIUM PHOSPHATE, F. O. B. MINES, 1904 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1904	122	121	121	122	114	112	114	113	111	110	110	110	115
1905	105	104	104	110	112	112	114	119	118	118	117	117	113
1906	112	111	111	120	126	126	128	133	133	152	167	167	132
1907	160	158	158	159	160	160	163	169	240	239	216	216	183
1908	188	145	117	109	112	112	114	112	102	96	97	103	118
1909	100	106	104	105	105	105	107	112	111	110	110	105	107
1910	106	110	110	107	105	105	102	104	105	108	110	110	107
1911	105	104	104	105	105	105	103	107	108	107	106	106	106
1912	102	101	101	102	102	102	104	108	108	107	106	106	104
1913	102	101	101	102	102	102	104	90	90	89	89	89	97
1914	85	84	84	85	85	85	87	90	90	89	89	89	87
1915	85	84	84	85	85	85	83	83	82	82	82	82	83
1916	78	77	77	78	78	78	80	83	82	82	82	71	79
1917	58	57	57	58	58	58	77	92	92	91	91	96	73
1918	92	91	98	98	99	101	115	144	143	142	142	142	117
1919	136	135	135	136	136	136	139	144	...	...	...	...	139
1920	...	184	184	186	186	233	312	324	321	322	313	262	255
1921	251	249	222	142	143	150	153	158	158	151	121	92	167
1922	88	87	87	88	88	88	90	94	82	82	82	82	87
1923	71	78	81	81	82	82	87	94	93	93	92	92	85
1924	88	67	61	61	61	61	62	63	62	61	61	60	64
1925	57	57	57	57	60	68	71	76	76	76	81	81	68
1926	81	84	87	87	87	87	89	92	92	91	91	91	88
1927	86	83	83	84	84	84	85	89	89	88	88	88	86
1928	84	83	83	84	84	...	...	...	...	...	...	...	...

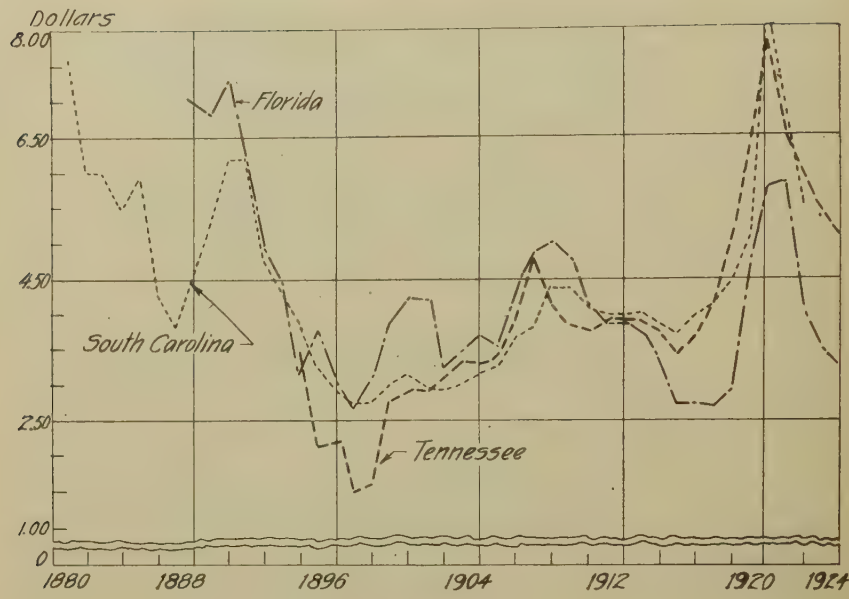

FIGURE 5. VALUE OF PHOSPHATE ROCK PER LONG TON AT MINES IN SOUTH CAROLINA, FLORIDA, AND TENNESSEE, 1881 TO 1924

Prices in the three States tend to move together

Seasonal variation in prices of phosphate rock

The index numbers of the seasonal variation in the prices of 68-per-cent Florida land pebble and 75-per-cent Tennessee phosphate rock are given in tables 8 and 9. For the five years 1922 to 1926, Florida land pebble was slightly higher in price during July and August than during the rest

TABLE 8. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF 68-PER-CENT FLORIDA LAND PEBBLE

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1904–1913.....	104	101	99	99	99	99	98	95	100	102	102	102
1905–1909.....	104	99	94	95	96	96	96	95	105	107	106	106
1910–1914.....	102	103	103	102	102	102	100	96	97	97	98	98
1922–1926.....	100	98	98	98	98	100	102	103	100	100	101	101

TABLE 9. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF 75-PER-CENT TENNESSEE PHOSPHATE ROCK

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1901–1913*....	99	101	98	100	100	100	100	100	100	100	101	101
1901–1904.....	98	104	102	101	100	100	100	98	98	98	101	101
1905–1909*....	100	99	92	100	101	101	101	101	101	101	101	101
1910–1914.....	100	100	100	100	100	100	100	100	100	100	100	100
1922–1926.....	105	103	99	96	96	98	101	101	101	101	101	99

*1906 omitted; data not complete.

of the year. During the five years 1910 to 1914, the index numbers were highest during the first half of the year. This was due partly to the fact that there was a downward trend in prices during that period, and therefore prices during the latter part of the year tended to be lower than during the first part. For the five years 1922 to 1926, Tennessee rock was highest in price during January and February. During the five pre-war years, 1910 to 1914, prices were stationary.

Exports of phosphate rock

The exports of phosphate rock from the United States increased from 868,000 tons in 1899 to 1,365,000 tons in 1913. Lack of shipping facilities, and high ocean freights, during the war period caused the abrupt decline in exports from 1,365,000 tons in 1913 to 122,000 tons in 1918. Exports recovered somewhat in 1919 and 1920, but they have remained considerably below the pre-war level. Due to the more rapid increase in domestic consumption, the exports are of less importance than formerly.

With the rapid development of phosphate mining by the French in northern Africa, and with high ocean freight rates, it is improbable that the exports of phosphate rock from the United States will resume their pre-war importance. Exports for the four years 1921 to 1924 averaged 790,000 long tons, as compared with 1,250,000 for the four years 1910 to 1913.

During the fifteen years 1899 to 1913, exports were largest in April and May and in August and September. For the three years 1922 to 1924, exports were largest in May and lowest during January, February, and March. (Table 10.)

TABLE 10. INDEX NUMBERS OF SEASONAL VARIATION IN EXPORTS OF PHOSPHATE ROCK

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1899–1913.....	70	71	109	118	118	112	107	118	118	99	85	76
1900–1904.....	60	78	110	125	108	103	110	108	121	110	91	77
1905–1909.....	82	78	121	119	113	118	101	117	115	87	79	70
1909–1913.....	62	62	106	109	127	119	105	124	122	100	87	77
1922–1924.....	79	74	78	93	160	110	108	117	102	95	100	84

Sulfuric acid

Practically no raw rock phosphate is used as such in commercial fertilizers. It is generally treated with sulfuric acid, producing superphosphate (acid phosphate). The phosphorus compounds in superphosphate (acid phosphate) are soluble in water, while rock phosphate is practically insoluble. Superphosphate (acid phosphate) is the important source of phosphoric acid in the fertilizer trade.

While sulfuric acid does not contain any plant nutrients, it may be considered as a fertilizer material since it is used extensively in the manufacture of fertilizer materials. The Federal Trade Commission Report on the Fertilizer Industry (1916, page 104) states that more than 60 per cent of the total output of sulphuric acid in the United States is used for fertilizer purposes.

Monthly wholesale prices and index numbers of the prices of sulfuric acid are given in tables 11 and 12. For the seventeen years 1897 to 1913, there was a downward trend in the price. The average annual decrease in the index numbers was 2.3 points. Although this was a period in which the general price level rose, sulfuric acid, like many other manufactured products, declined in price.

During the war period, there was a demand by war industries for sulfuric acid and prices increased rapidly. They reached a peak of 262 per cent of pre-war prices early in 1916. With deflation, prices declined rapidly and fell to 71 per cent of pre-war prices in August, 1922. Since that time, sulfuric acid has been relatively cheap. For the five years 1922 to 1926, the price averaged 72 per cent of pre-war prices.

There is practically no seasonal variation in the price of sulfuric acid. For the six years 1909 to 1914, the price did not change.

Superphosphate (acid phosphate)

Superphosphate (acid phosphate) is used as a fertilizer by itself, and it is also the source of phosphoric acid in many complete or mixed fertilizers. Since a large part of the phosphate rock used in the United States is manufactured into superphosphate (acid phosphate), the trend of superphosphate (acid-phosphate) production has probably been somewhat similar to the consumption of phosphate rock.

During the eight years 1900 to 1907, the price of superphosphate (acid phosphate) averaged nearly 120 per cent of pre-war prices. During the eight years 1907 to 1914, the index number of the price of superphosphate (acid phosphate) declined from 125 to 89 (table 14); that of sulfuric acid, from 129 to 100 (table 12); and that of 68-per-cent Florida land pebble, from 183 to 87 (table 7). Thus the decline in the price of superphosphate (acid phosphate) was due primarily to decreases in the prices of materials from which it is made.

TABLE 11. PRICES OF 66°-BAUMÉ SULFURIC ACID PER SHORT TON IN TANK CARS, NEW YORK CITY, 1897 TO 1928*
(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914.....	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00	$21.00
1897.....	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	19.50	19.50	19.50	23.62	21.84
1898.....	25.00	25.00	25.00	22.12	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	27.76
1899.....	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50
1900.....	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50
1901.....	29.50	29.50	29.50	29.50	29.50	29.50	29.70	31.50	31.20	30.95	29.12	32.50	30.16
1902.....	32.50	32.50	32.50	28.75	25.00	25.00	26.50	27.00	27.00	27.00	26.25	26.00	28.00
1903.....	26.00	26.00	26.00	26.25	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	26.69
1904.....	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	26.50	27.00	26.96
1905.....	27.00	27.00	27.00	27.00	27.00	23.25	24.00	25.00	25.00	25.00	25.00	25.00	25.60
1906.....	22.00	22.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	24.50
1907.....	25.00	25.00	26.88	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.03
1908.....	28.50	28.50	28.50	21.38	19.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	22.74
1909.....	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
1910.....	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
1911.....	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
1912.....	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
1913.....	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
1914.....	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
1915.....	21.00	21.00	21.00	21.00	21.00	29.62	32.50	32.50	42.50	42.50	42.50	43.75	30.91
1916.....	53.00	55.00	55.00	55.00	55.00	53.12	36.50	36.50	35.00	35.00	35.00	35.00	44.80
1917.....	35.00	35.00	40.00	39.50	37.50	37.50	39.00	40.00	40.00	42.50	47.50	48.00	40.12
1918.....	45.00	46.25	47.50	47.50	45.00	37.50	28.00	28.00	28.00	25.00	25.00	25.00	35.65
1919.....	25.00	23.00	21.80	19.50	18.00	18.00	18.00	18.00	20.00	21.00	23.38	23.50	20.77
1920.....	23.00	22.50	23.70	24.50	†24.50	†24.50	†23.75	22.90	22.00	22.00	21.60	19.81	22.90
1921.....	19.40	20.50	20.38	20.00	19.20	19.00	19.00	19.00	19.00	17.50	17.50	17.50	19.00
1922.....	16.70	16.50	16.50	17.06	16.65	16.50	15.20	15.00	15.38	15.30	15.00	15.00	15.90
1923.....	15.00	15.00	15.00	15.10	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.34
1924.....	15.50	15.25	15.00	15.00	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.73
1925.....	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50
1926.....	14.50	14.50	14.50	14.50	15.10	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.13
1927.....	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.60	15.75	15.56	15.53
1928.....	15.50	15.50	15.50	15.50	15.50	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of sulfuric acid were obtained from the *Oil, Paint and Drug Reporter*.
† Future price.

TABLE 12. INDEX NUMBERS OF PRICES OF 66°-BAUMÉ SULFURIC ACID PER SHORT TON IN TANK CARS, NEW YORK CITY, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	107	107	107	107	107	107	107	107	93	93	93	112	104
1898	119	119	119	105	140	140	140	140	140	140	140	140	132
1899	140	140	140	140	140	140	140	140	140	140	140	140	140
1900	140	140	140	140	140	140	140	140	140	140	140	140	140
1901	140	140	140	140	140	140	141	150	149	147	139	155	144
1902	155	155	155	137	119	119	126	129	129	129	125	124	133
1903	124	124	124	125	129	129	129	129	129	129	129	129	127
1904	129	129	129	129	129	129	129	129	129	129	126	129	128
1905	129	129	129	129	129	111	114	119	119	119	119	119	122
1906	105	105	119	119	119	119	119	119	119	119	119	119	117
1907	119	119	128	131	131	131	131	131	131	131	131	131	129
1908	136	136	136	102	90	100	100	100	100	100	100	100	108
1909	100	100	100	100	100	100	100	100	100	100	100	100	100
1910	100	100	100	100	100	100	100	100	100	100	100	100	100
1911	100	100	100	100	100	100	100	100	100	100	100	100	100
1912	100	100	100	100	100	100	100	100	100	100	100	100	100
1913	100	100	100	100	100	100	100	100	100	100	100	100	100
1914	100	100	100	100	100	100	100	100	100	100	100	100	100
1915	100	100	100	100	100	141	155	155	202	202	202	208	147
1916	252	262	262	262	262	253	174	167	167	167	167	167	213
1917	167	167	190	188	179	179	186	190	190	202	226	229	191
1918	214	220	226	226	214	179	133	133	133	119	119	119	170
1919	119	110	104	93	86	86	86	86	95	100	111	112	99
1920	110	107	113	117	117	117	113	109	105	105	103	94	109
1921	92	98	97	95	91	90	90	90	90	83	83	83	90
1922	80	79	79	81	79	79	72	71	73	73	71	71	76
1923	71	71	71	72	74	74	74	74	74	74	74	74	73
1924	74	73	71	71	69	69	69	69	69	69	69	69	70
1925	69	69	69	69	69	69	69	69	69	69	69	69	69
1926	69	69	69	69	72	74	74	74	74	74	74	74	72
1927	74	74	74	74	74	74	74	74	74	74	75	74	74
1928	74	74	74	74	74	...	...	...	...	...	...	...	...

TABLE 13. PRICES OF SUPERPHOSPHATE (ACID PHOSPHATE) IN BULK, PER UNIT, BALTIMORE, 1897 TO 1928*

(Dollars per unit)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897–1913.....	$0.604	$0.602	$0.597	$0.595	$0.593	$0.595	$0.599	$0.601	$0.603	$0.602	$0.598	$0.596	$0.599
1909–1913.....	0.569	0.569	0.569	0.565	0.564	0.564	0.556	0.548	0.547	0.547	0.547	0.547	0.558
1910–1914.....	0.547	0.547	0.547	0.543	0.542	0.542	0.534	0.527	0.527	0.527	0.527	0.527	0.536
1897.....	0.545	0.545	0.545	0.535	0.505	0.505	0.505	0.505	0.505	0.505	0.507	0.510	0.518
1898.....	0.506	0.501	0.475	0.475	0.475	0.512	0.625	0.625	0.625	0.625	0.625	0.625	0.558
1899.....	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.603	0.570	0.570	0.614
1900.....	0.610	0.610	0.635	0.635	0.635	0.630	0.640	0.662	0.662	0.662	0.653	0.625	0.638
1901.....	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625
1902.....	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625	0.625
1903.....	0.625	0.625	0.634	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.636
1904.....	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638
1905.....	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638
1906.....	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.638
1907.....	0.638	0.638	0.638	0.638	0.638	0.638	0.638	0.681	0.725	0.725	0.725	0.725	0.671
1908.....	0.712	0.675	0.595	0.575	0.575	0.575	0.575	0.575	0.575	0.575	0.545	0.538	0.591
1909.....	0.585	0.585	0.585	0.585	0.585	0.585	0.585	0.579	0.575	0.575	0.575	0.575	0.581
1910.....	0.575	0.575	0.575	0.575	0.575	0.575	0.601	0.635	0.635	0.635	0.635	0.635	0.602
1911.....	0.635	0.635	0.635	0.616	0.610	0.610	0.542	0.525	0.525	0.525	0.525	0.525	0.516
1912.....	0.525	0.525	0.525	0.525	0.525	0.525	0.525	0.525	0.525	0.525	0.525	0.525	0.525
1913.....	0.525	0.525	0.525	0.525	0.525	0.525	0.525	0.475	0.475	0.475	0.475	0.475	0.504
1914.....	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475
1915.....	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.500	0.575	0.775	0.825	0.540
1916.....	0.825	0.825	0.825	0.825	0.825	0.825	0.825	0.703	0.703	0.703	0.703	0.703	0.774
1917.....	0.734	0.734	0.734	0.766	0.891	0.938	0.969	0.969	1.039	1.138	1.062	1.062	0.920
1918.....	1.062	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.109	1.062	1.113
1919.....	1.062	1.062	1.050	1.000	0.969	0.994	1.055	1.098	1.125	1.125	1.125	1.203	1.072
1920.....	1.234	1.234	1.188	1.172	1.159	1.211	1.312	1.312	1.312	1.312	1.212	1.176	1.236
1921.....	1.016	0.938	0.938	0.906	0.825	0.766	0.719	0.769	0.781	0.759	0.672	0.641	0.811
1922.....	0.628	0.617	0.578	0.523	0.516	0.539	0.547	0.547	0.547	0.613	0.523	0.613	0.566
1923.....	0.609	0.609	0.609	0.609	0.555	0.523	0.516	0.516	0.516	0.516	0.516	0.508	0.550
1924.....	0.508	0.496	0.484	0.484	0.484	0.484	0.467	0.520	0.516	0.504	0.531	0.556	0.502
1925.....	0.562	0.562	0.562	0.562	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.587
1926.....	0.625	0.625	0.650	0.650	0.610	0.600	0.600	0.600	0.600	0.548	0.531	0.531	0.598
1927.....	0.531	0.543	0.547	0.547	0.547	0.516	0.531	0.528	0.531	0.531	0.531	0.531	0.535
1928.....	0.531	0.531	0.531	0.531	0.531	.....	.....	.....	.....	.....	.....	.....	.....

* One unit is 1 per cent available P_2O_5 per ton of 2000 pounds.

Prices of superphosphate (acid phosphate) were obtained from the *Oil, Paint and Drug Reporter*. For the period from August, 1916, to April, 1925, the quoted ton price of 16-per-cent acid phosphate was divided by 16 to get the unit price. During 1917, and from 1921 to May, 1928, the quotations were specified as Baltimore prices. All superphosphate (acid-phosphate) prices are assumed to be comparable Baltimore quotations.

TABLE 14. INDEX NUMBERS OF PRICES OF SUPERPHOSPHATE (ACID PHOSPHATE) IN BULK, PER UNIT, BALTIMORE, 1897 TO 1928
(1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	102	102	102	100	94	94	94	94	94	94	95	95	97
1898	94	93	89	89	89	96	117	117	117	117	117	117	104
1899	117	117	117	117	117	117	117	117	117	112	106	106	115
1900	114	114	118	118	118	118	119	124	124	124	122	117	119
1901	117	117	117	117	117	117	117	117	117	117	117	117	117
1902	117	117	117	117	117	117	117	117	117	117	117	117	117
1903	117	117	118	119	119	119	119	119	119	119	119	119	119
1904	119	119	119	119	119	119	119	119	119	119	119	119	119
1905	119	119	119	119	119	119	119	119	119	119	119	119	119
1906	119	119	119	119	119	119	119	119	119	119	119	119	119
1907	119	119	119	119	119	119	119	127	135	135	135	135	125
1908	133	126	111	107	107	107	107	107	107	107	102	100	110
1909	109	109	109	109	109	109	109	108	107	107	107	107	108
1910	107	107	107	107	107	107	112	118	118	118	118	118	112
1911	118	118	118	115	114	114	101	98	98	98	98	98	107
1912	98	98	98	98	98	98	98	98	98	98	98	98	98
1913	98	98	98	98	98	98	98	89	89	89	89	89	94
1914	89	89	89	89	89	89	89	89	89	89	89	89	89
1915	89	89	89	89	89	89	89	89	93	107	145	154	101
1916	154	154	154	154	154	154	154	131	131	131	131	131	144
1917	137	137	137	143	166	175	181	181	194	212	198	198	172
1918	198	210	210	210	210	210	210	210	210	210	207	198	208
1919	198	198	196	187	181	185	197	205	210	210	210	224	200
1920	230	230	222	219	216	226	245	245	245	245	226	219	231
1921	190	175	175	169	154	143	134	143	146	142	125	120	151
1922	117	115	108	98	96	101	102	102	102	114	98	114	106
1923	114	114	114	114	104	98	96	96	96	96	96	95	103
1924	95	91	90	90	90	90	87	97	96	94	99	104	94
1925	105	105	105	105	112	112	112	112	112	112	112	112	110
1926	117	117	121	121	114	112	112	112	112	102	99	99	112
1927	99	101	102	102	102	96	99	99	99	99	99	99	100
1928	99	99	99	99	...	...	...	...	...	...	...	...	...

Prices were high during the war and in the post-war inflation period. They were highest (245 per cent of pre-war) from July to October, 1920. During 1921, prices fell rapidly, and they reached a low point (96 per cent of pre-war) in May, 1922, a decline of 149 points in nineteen months. In 1924 there was a further decline to 87 per cent of pre-war. This was the lowest price for the thirty-one years 1897 to 1927. For the five years 1922 to 1926, superphosphate (acid phosphate) was relatively cheap, the average price being 105 per cent of the pre-war level.

During the seventeen years 1897 to 1913, there was very little seasonal variation in the price of superphosphate (acid phosphate) (table 15).

TABLE 15. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF SUPERPHOSPHATE (ACID PHOSPHATE)

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1897–1913.....	101	100	100	99	99	99	100	100	101	100	100	100
1900–1904.....	99	99	109	100	100	100	100	101	101	101	100	100
1905–1909.....	103	102	99	99	99	99	99	100	101	101	100	100
1910–1914.....	102	102	102	101	101	101	100	98	98	98	98	98
1922–1926.....	105	104	103	101	99	98	97	99	99	99	96	100

For the five years 1910 to 1914, prices tended to be slightly higher in January, February, and March than during the rest of the year. Part of this variation is due to the fact that there was a general downward trend in the price of superphosphate (acid phosphate), and therefore prices during the first months of the year tended to be somewhat higher than those during the latter months. For the five years 1922 to 1926, prices were highest in January and lowest in November.

Bone products

Bones have been used as a source of phosphoric acid for fertilizing purposes for many years. The mineral matter in bones is chiefly tricalcium phosphate, while the organic matter contains considerable nitrogen. Steamed bone meal is the form most commonly used in the fertilizer trade. The bones are boiled or steamed, the fats and most of the nitrogenous content are extracted, and then the bones are ground. Raw bone is less common in the fertilizer trade than steamed bone meal, because the fat and the gelatin content of bones have no fertilizer value; but these products have considerable value for other purposes. Bone meal and other bone products used for fertilizer are manufactured by packers and fertilizer manufacturers. The bones are obtained from slaughtering or rendering establishments in the United States, or are imported.

Prices and index numbers of raw ground bones 4 per cent ammonia and 50 per cent bone phosphate of lime, and ground steamed bones 1¼ per cent ammonia and 60 per cent bone phosphate of lime, are given in

TABLE 16. PRICES OF RAW GROUND BONES, 4 PER CENT AMMONIA AND 50 PER CENT BONE PHOSPHATE OF LIME, IN BULK, PER SHORT TON, F. O. B. CHICAGO, 1903 TO 1926*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$28.25	$28.25	$28.25	$28.55	$28.55	$28.55	$28.55	$28.57	$28.65	$28.71	$28.80	$28.80	$28.54
1903	20.50	20.50	20.50	20.50	20.50	20.10	19.50	19.50	20.06	21.75	21.75	20.81	20.50
1904	25.00	25.00	25.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1905	.....	.....	.....	.....	.....	.....	.....	.....	16.00	16.00	16.00	16.00	.....
1906	16.00	16.00	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.58
1907	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50	16.70	17.00	17.00	17.00	15.98
1908	17.00	16.94	16.75	16.75	16.75	16.75	16.75	16.75	17.00	18.06	20.80	21.25	17.63
1909	27.50	27.00	27.00	27.00	27.00	27.00	27.00	26.70	26.50	26.50	26.50	26.50	26.85
1910	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.60	27.00	27.00	27.00	27.00	26.68
1911	27.00	27.00	27.00	28.50	28.50	28.50	28.50	28.50	28.50	28.80	29.25	29.25	28.28
1912	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
1913	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
1914	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
1915	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
1916	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
1917	32.85	33.75	33.75	33.75	33.75	33.75	33.75	33.75	36.56	37.50	37.50	37.50	34.85
1918	38.75	40.00	40.00	40.80	42.00	42.00	42.80	44.00	45.20	50.00	50.00	45.00	43.38
1919	44.25	43.50	45.80	44.75	44.00	44.80	46.00	46.00	46.20	45.00	45.00	47.40	45.22
1920	48.00	49.00	52.00	52.00	51.55	58.75	61.25	61.25	60.31	55.00	49.00	41.25	53.28
1921	40.00	40.00	33.75	32.38	31.00	31.00	31.00	28.50	29.00	30.20	31.00	31.00	32.40
1922	31.00	30.44	28.75	32.50	32.50	32.50	37.50	37.50	37.50	35.55	34.25	34.25	33.69
1923	34.25	34.25	34.25	37.00	33.50	33.50	33.50	29.50	26.50	26.50	26.50	26.50	31.31
1924	26.50	26.50	27.40	27.25	26.50	26.50	26.50	26.50	26.50	26.25	26.00	26.00	26.53
1925	26.00	26.00	26.00	26.00	26.00	27.60	28.00	28.00	28.00	28.00	28.00	28.00	27.13
1926	28.00	28.00	27.00	28.00	28.00	28.00	28.00	28.00	.....	.....	.....	.....	.....

* Prices of raw ground bones were obtained from the *Oil, Paint and Drug Reporter*.

TABLE 17. INDEX NUMBERS OF PRICES OF RAW GROUND BONES, 4 PER CENT AMMONIA AND 50 PER CENT BONE PHOSPHATE OF LIME, IN BULK, PER SHORT TON, F. O. B. CHICAGO, 1903 TO 1926

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1903	73	73	73	72	72	70	68	68	70	76	76	72	72
1904	88	88	88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1905	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1906	57	57	55	54	54	54	54	54	54	54	54	54	55
1907	55	55	55	54	54	54	54	54	58	59	59	59	56
1908	60	60	59	59	59	59	59	59	59	63	72	74	62
1909	97	96	96	95	95	95	95	93	92	92	92	92	94
1910	94	94	94	93	93	93	93	93	94	94	94	94	93
1911	96	96	96	100	100	100	100	100	99	100	102	102	99
1912	104	104	104	102	102	102	102	102	102	102	102	102	102
1913	104	104	104	102	102	102	102	102	102	102	102	102	102
1914	104	104	104	102	102	102	102	102	102	102	102	102	102
1915	104	104	104	102	102	102	102	102	102	102	102	102	102
1916	104	104	104	102	102	102	102	102	102	102	102	102	102
1917	116	119	119	118	118	118	118	118	128	131	130	130	122
1918	137	142	142	143	147	147	150	154	158	174	174	156	152
1919	157	154	162	157	154	157	161	161	161	157	156	165	158
1920	170	173	184	182	181	206	215	214	211	192	170	143	187
1921	142	142	119	113	109	109	109	100	101	105	108	108	114
1922	110	108	102	114	114	114	131	131	131	124	119	119	118
1923	121	121	121	130	117	117	117	103	92	92	92	92	110
1924	94	94	97	95	93	93	93	93	92	91	90	90	93
1925	92	92	92	91	91	97	98	98	98	98	96	96	95
1926	99	99	96	98	98	98	98	98	.....	.....	.....	.....	.....

TABLE 18. PRICES OF GROUND STEAMED BONES, 1¼ PER CENT AMMONIA AND 60 PER CENT BONE PHOSPHATE OF LIME, IN BULK, PER SHORT TON, F. O. B. CHICAGO, 1897 TO 1928*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914.....	$20.35	$20.35	$20.35	$20.35	$20.35	$20.35	$20.14	$20.35	$20.35	$20.45	$20.60	$20.60	$20.38
1897.....	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
1898.....	21.75	21.75	21.75	21.75	21.45	20.50	20.50	20.50	20.50	20.50	20.50	20.50	21.00
1899.....	20.50	20.75	21.50	21.50	21.65	22.25	22.25	22.25	22.25	22.25	22.25	22.25	21.80
1900.....	22.12	21.75	21.75	21.75	21.75	21.75	21.90	22.00	22.00	22.00	22.00	21.75	21.88
1901.....	21.75	21.50	21.50	21.30	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.84
1902.....	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
1903.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1904.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1905.....	21.50	20.75	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.19
1906.....	20.00	20.00	19.62	19.62	19.62	19.62	19.62	19.62	19.41	18.75	18.75	18.75	19.45
1907.....	18.75	18.75	18.75	18.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
1908.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1909.....	21.25	21.25	21.25	21.25	21.25	21.25	21.25	20.05	19.25	19.25	19.25	19.25	20.48
1910.....	19.25	19.25	19.25	19.25	19.25	19.25	19.62	21.00	21.00	21.00	21.00	21.00	20.01
1911.....	21.00	21.00	21.00	21.00	21.00	21.00	19.60	19.25	19.25	19.75	20.50	20.50	20.40
1912.....	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
1913.....	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
1914.....	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
1915.....	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
1916.....	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20 50	20.50	20.50	20.50
1917.....	22.70	23.25	23.25	23.25	23.25	23.25	23.25	23.25	29.88	32.50	32.50	31.90	26.02
1918.....	32.50	34.00	34.00	32.80	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.78
1919.....	30.50	30.00	30.00	30.00	30.00	30.00	30.00	30.00	31.20	32.00	32.00	32.00	30.64
1920.....	32.00	32.00	32.00	32.00	33.20	35.88	41.50	41.50	42.25	42.50	38.00	29.75	36.05
1921.....	28.50	28.50	26.50	25.88	23.90	23.50	23.50	22.10	21.00	21.00	21.00	21.00	23.87
1922.....	21.00	21.75	25.62	26.50	23.50	24.75	28.55	31.25	31.25	27.50	25.00	25.00	25.97
1923.....	25.30	25.50	25.62	24.00	24.00	24.00	24.00	23.75	23.00	22.60	22.50	22.60	23.91
1924.....	23.00	23.00	22.60	21.00	21.00	21.00	21.00	21.00	21.00	21.00	20.62	20.50	21.39
1925.....	20.50	20.50	20.50	20.50	22.50	24.50	24.50	24.50	27.68	26.94	23.50	23.00	23.26
1926.....	23.00	23.75	26.00	28.00	29.20	30.00	30.00	30.50	30.75	29.00	27.90	27.50	27.97
1927.....	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
1928.....	29.00	37.00	37.00	37.00	37.00	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of ground steamed bones were obtained from the *Oil, Paint and Drug Reporter*. For the six years 1897 to 1902, the quotations were for ground bones, no analysis nor market being specified. For the periods from January, 1905, to February, 1906, from January, 1909, to May, 1910, and from February, 1921, to May, 1928, the analyses were given as 1¼ per cent ammonia and 60 per cent bone phosphate. From March, 1906, to April, 1907, and from June, 1920, to January, 1921, the analyses were given as 1½ per cent ammonia and 50 per cent bone phosphate. For the period from 1906 to 1928, the quotations were specified as being f. o. b. Chicago.

TABLE 19. INDEX NUMBERS OF PRICES OF GROUND STEAMED BONES, 1¼ PER CENT AMMONIA AND 60 PER CENT BONE PHOSPHATE OF LIME, IN BULK, PER SHORT TON, F. O. B. CHICAGO, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	107	107	107	107	107	107	108	107	107	106	106	106	107
1898	107	107	107	107	105	101	102	101	101	100	100	100	103
1899	101	102	106	106	106	109	110	109	109	109	108	108	107
1900	109	107	107	107	107	107	109	108	108	108	107	106	107
1901	107	106	106	105	101	101	102	101	101	100	100	100	102
1902	101	101	101	101	101	101	102	101	101	100	100	100	101
1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1904	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1905	106	102	98	98	98	98	99	98	98	98	97	97	99
1906	98	98	96	96	96	96	97	96	95	92	91	91	95
1907	92	92	92	92	.....	.....	.....	.....	.....	.....	.....	.....	.....
1908	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1909	104	104	104	104	104	104	106	99	95	94	93	93	100
1910	95	95	95	95	95	95	97	103	103	103	102	102	98
1911	103	103	103	103	103	103	97	95	95	97	100	100	100
1912	101	101	101	101	101	101	102	101	101	100	100	100	101
1913	101	101	101	101	101	101	102	101	101	100	100	100	101
1914	101	101	101	101	101	101	102	101	101	100	100	100	101
1915	101	101	101	101	101	101	102	101	101	100	100	100	101
1916	101	101	101	101	101	101	102	101	101	100	100	100	101
1917	112	114	114	114	114	114	115	114	147	159	158	155	128
1918	160	167	167	161	152	152	154	152	152	152	150	150	156
1919	150	147	147	147	147	147	149	147	153	156	155	155	150
1920	157	157	157	157	163	176	206	204	208	208	184	144	177
1921	140	140	130	127	117	115	117	109	103	103	102	102	117
1922	103	107	126	130	115	122	142	154	154	134	121	121	127
1923	124	125	126	118	118	118	119	117	113	111	109	110	117
1924	113	113	111	103	103	103	104	103	103	103	100	100	105
1925	101	101	101	101	111	120	122	120	136	132	114	112	114
1926	113	117	128	138	143	147	149	150	151	142	135	133	137
1927	143	143	143	143	143	143	144	143	143	142	141	141	142
1928	143	182	182	182	182	.....	.....	.....	.....	.....	.....	.....	.....

tables 16 to 19, inclusive. The price per ton of raw ground bones increased from $15.58 in 1906 to $29.25 in 1913. The price of ground steamed bones increased from $19.45 to $20.50 during the same years. The increase in the price of raw ground bones was much the greater. Raw ground bones contained 4 per cent of ammonia, while the ground steamed bones contained only 1¼ per cent. The eight years 1906 to 1913 constituted a period of steadily rising prices for organic ammoniates, and thus the bone products which carried the higher percentage of ammonia increased more in price. Raw ground bones contained 50 per cent of bone phosphate, and ground steamed bones contained 60 per cent. Superphosphate (acid-phosphate) prices declined during this period. Thus the commodity having the higher percentage of bone phosphate would tend to decline more. The variation in the analysis of these two products and the different trends in the price of ammonia and of phosphates explain the differences in the price change.

The general movement of the prices of ground steamed bones and raw ground bones during and following the inflation period was similar to that of many other fertilizer materials; that is, a period of rising prices reaching a peak in 1920, a rapid decline with deflation to about pre-war levels, and comparatively stable prices for the five years 1922 to 1926. For the four years 1922 to 1925, ground steamed bones averaged 116 per cent of pre-war prices while raw ground bones averaged only 104 per cent.

For the pre-war period there was practically no seasonal variation in the price of ground steamed bones (table 20). For the five years 1922 to 1926,

TABLE 20. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF GROUND STEAMED BONES

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1897–1913*....	101	101	100	100	100	100	100	100	99	99	100	99
1898–1902.....	101	100	101	101	100	100	100	100	100	100	100	100
1910–1914.....	100	100	100	100	100	100	99	100	100	100	101	101
1922–1926.....	92	94	98	98	98	101	104	107	109	104	98	97

* The figures are for thirteen years only; the prices for 1903, 1904, 1907, and 1908 were not quoted.

however, prices were 9 per cent above the average yearly price in September and 8 per cent below in January.

Index numbers of wholesale prices of phosphoric acid

A weighted index number of the price of phosphoric acid was made from the prices of superphosphate (acid phosphate), raw ground bones, and ground steamed bones.[2] The weights used in making the index were obtained from the 1914 and the 1919 Census of Manufactures. These weights are: acid phosphate, 4,600,000 tons; raw ground bones, 102,000 tons; ground steamed bones, 57,000 tons.

[2] Prices were not available for all of the series for the entire period from 1897 to 1928. The phosphoric-acid index is based on the prices of superphosphate (acid phosphate) and steamed bones for the six years 1897 to 1902, and for 1926, 1927, and 1928; for the four years 1903, 1904, 1907, and 1908, the index is based on the prices of superphosphate (acid phosphate).

TABLE 21. INDEX NUMBERS OF PRICES OF PHOSPHORIC ACID, 1897 TO 1928

(1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	102	102	102	100	95	95	95	95	95	95	95	95	97
1898	95	94	89	89	89	98	116	116	116	116	116	116	104
1899	116	116	116	116	116	116	116	116	116	112	106	106	114
1900	114	114	118	118	118	117	119	123	123	123	121	116	119
1901	116	116	116	116	116	116	116	116	116	116	116	116	116
1902	116	116	116	116	116	116	116	116	116	116	116	116	116
1903	117	117	118	119	119	119	119	119	119	119	119	119	119
1904	119	119	119	119	119	119	119	119	119	119	119	119	119
1905	119	118	118	118	118	118	118	118	118	118	118	118	118
1906	118	118	118	118	118	118	118	118	118	118	118	118	118
1907	119	119	119	119	119	119	119	127	135	135	135	135	125
1908	133	126	111	107	107	107	107	107	107	107	102	100	110
1909	108	108	108	108	108	108	108	107	106	106	106	106	107
1910	106	106	106	106	106	106	111	116	116	116	116	116	111
1911	116	116	116	114	112	112	101	98	98	98	98	98	107
1912	98	98	98	98	98	98	98	98	98	98	98	98	98
1913	98	98	98	98	98	98	98	90	90	90	90	90	95
1914	90	90	90	90	90	90	90	90	90	90	90	90	90
1915	90	90	90	90	90	90	90	90	94	107	141	149	101
1916	149	149	149	149	149	149	149	128	128	128	128	128	140
1917	135	135	135	140	162	170	175	175	188	205	193	192	167
1918	193	204	204	204	204	204	204	204	205	206	203	194	202
1919	194	194	192	183	178	182	193	200	205	205	205	219	196
1920	224	224	217	214	212	223	241	242	241	240	221	212	226
1921	185	172	170	164	150	140	132	139	142	138	124	118	148
1922	116	114	108	99	98	102	105	105	105	116	100	115	107
1923	114	114	114	115	105	99	98	97	96	96	96	95	103
1924	95	92	91	91	91	91	90	97	96	94	99	103	94
1925	104	104	104	104	110	111	111	111	112	111	111	111	109
1926	116	117	121	122	115	113	113	113	113	103	100	100	112
1927	100	102	103	103	103	98	100	100	100	100	100	100	101
1928	100	101	101	101	101	.....	.....	.....	.....	.....	.....	.....	.....

For the seventeen-year period from 1897 to 1913, there was a general downward trend in the price of phosphoric acid. The average annual decrease in the index numbers was 0.4 point. (Figure 6.)

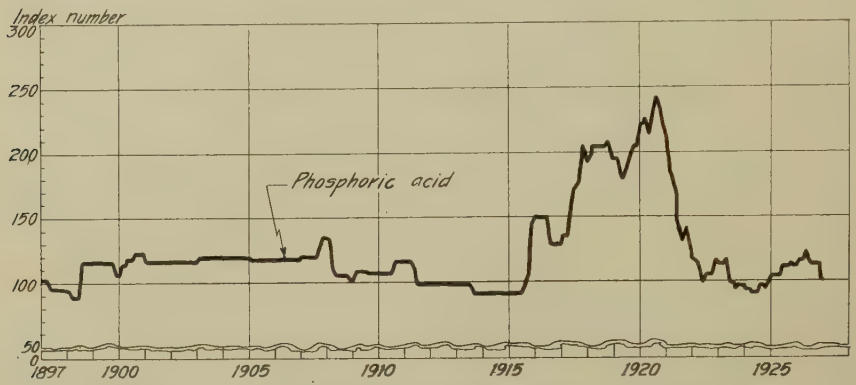

FIGURE 6. INDEX NUMBERS OF PRICES OF PHOSPHORIC ACID, 1897 TO 1927
Phosphoric-acid prices are now only slightly above the pre-war level

Superphosphate is the major source of phosphoric acid in commercial fertilizers. It is made by treating raw rock phosphate with sulfuric acid. Prices of sulfuric acid declined from an index of 144 in 1901 to 100 in 1909. During the eight-year period 1908 to 1915, the index number of the price of phosphate rock at the mines declined from 124 to 77. The decrease in the price of phosphoric acid was due primarily to decreases in the prices of these materials.

Phosphoric acid was high in price during the World War and the post-war inflation period. The peak was reached in August, 1920, when prices were 242 per cent of the pre-war level. With the deflation and the agricultural depression that followed, the index number of the price of phosphoric acid fell to 98 in May, 1922, a decline of 144 points in twenty-one months. After a slight recovery later in 1922 and in 1923, the index declined to 90 in July, 1924. This was the lowest price for the thirty-year period from 1897 to 1926. In 1926 the index number of prices of phosphoric acid was 112, farm prices in the United States were 142, and wholesale prices of all commodities in the United States were 154.

AMMONIATES

Although the air is about 80 per cent nitrogen, many plants do not have the power to acquire nitrogen from this source. Legumes, such as clover, alfalfa, beans, and peas, have organisms associated with them which transform atmospheric nitrogen into forms that can be used by the plant. Most plants, however, obtain nitrogen from compounds in the soil.

The principal nitrogenous materials, known in the trade as ammoniates, used in making fertilizer are nitrate of soda, sulfate of ammonia, cyanamid, cottonseed meal, tankage, blood, and fish scrap. Some other materials are used also. Nitrate of soda, sulfate of ammonia, and some synthetic nitrogen products, are mineral substances and are known as the mineral, or inorganic, ammoniates. The ammoniates tankage, blood, fish scrap, cottonseed meal, and cyanamid, are carbon compounds and therefore are known as organic ammoniates.

Mineral ammoniates

Nitrate of soda

Commercial nitrate of soda contains 15.65 per cent of nitrogen, or 19 per cent of ammonia. Nitrate of soda is used in mixed fertilizers and also as a top-dressing for cotton, citrus fruits, and sugar beets. Chilean nitrate of soda has been the chief source of nitrate nitrogen in commercial fertilizers in the United States. The only deposits of this mineral which have been exploited on a commercial scale are in northern Chile.

During the seventeen years 1897 to 1913, the average yearly increase in the imports of nitrate of soda was 29,873 long tons, or a percentage increase of 9.2 per cent. This was a period of rising prices of agricultural products and increasing agricultural prosperity. These factors tended to increase the consumption of fertilizer materials.

During the World War, there was a large increase in the imports of nitrate for the production of explosives. With the armistice, war demands ceased and imports declined. With the inflation of 1919 to 1920 and the high prices of agricultural products, imports recovered in 1920, but with general deflation they again took a precipitous drop. Imports during the three years 1923 to 1925 averaged 83 per cent greater than for the five years 1910 to 1914.

Prices of nitrate of soda were relatively constant at about pre-war prices during the thirteen-year period from 1902 to 1914 (table 22). Although there were fluctuations from year to year, there was no consistent tendency for prices to increase.

With the demand for war munitions and the general inflation of prices, nitrate increased in price and reached a peak of 231 per cent of the

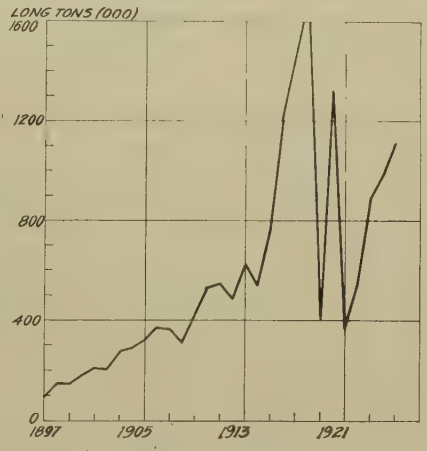

FIGURE 7. IMPORTS OF NITRATE OF SODA, 1897 TO 1925

Imports increased greatly during the war, when nitrate of soda was used in making munitions. During the three years 1923 to 1925, imports were 183 per cent of the pre-war level

TABLE 22. WHOLESALE SPOT PRICES OF NITRATE OF SODA IN 100-POUND BAGS, NEW YORK CITY, 1902 TO 1928*

(Dollars per 100-pound bags)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1902–1913.....	$2.25	$2.25	$2.28	$2.33	$2.33	$2.28	$2.24	$2.23	$2.24	$2.25	$2.26	$2.26	$2.26
1909–1913.....	2.24	2.23	2.24	2.27	2.30	2.28	2.27	2.25	2.26	2.28	2.27	2.24	2.26
1910–1914.....	2.24	2.24	2.25	2.28	2.30	2.27	2.25	2.23	2.23	2.23	2.22	2.20	2.25
1902.....	.....	2.27	2.33	2.44	2.19	2.14	2.03	1.90	1.89	1.89	1.97	2.03	2.10
1903.....	1.97	1.98	2.18	2.05	2.08	2.14	2.02	2.19	2.20	2.19	2.14	2.19	2.11
1904.....	2.19	2.17	2.18	2.32	2.27	2.14	2.16	2.15	2.18	2.21	2.29	2.35	2.22
1905.....	2.34	2.33	2.33	2.48	2.66	2.35	2.32	2.21	2.22	2.20	2.23	2.21	2.32
1906.....	2.19	2.21	2.22	2.26	2.30	2.27	2.28	2.38	2.49	2.58	2.56	2.53	2.36
1907.....	2.45	2.45	2.47	2.73	2.72	2.58	2.52	2.46	2.37	2.38	2.38	2.38	2.49
1908.....	2.40	2.43	2.40	2.32	2.30	2.27	2.26	2.25	2.19	2.14	2.16	2.18	2.28
1909.....	2.18	2.16	2.17	2.15	2.18	2.21	2.15	2.14	2.10	2.10	2.09	2.09	2.14
1910.....	2.09	2.09	2.13	2.15	2.13	2.11	2.10	2.10	2.11	2.14	2.14	2.14	2.12
1911.....	2.12	2.10	2.10	2.10	2.12	2.12	2.15	2.20	2.22	2.24	2.24	2.22	2.16
1912.....	2.21	2.21	2.20	2.36	2.45	2.45	2.47	2.49	2.52	2.55	2.55	2.55	2.42
1913.....	2.59	2.60	2.60	2.60	2.60	2.52	2.48	2.32	2.34	2.35	2.31	2.20	2.46
1914.....	2.21	2.22	2.22	2.22	2.24	2.19	2.09	2.08	1.99	1.90	1.90	1.90	2.10
1915.....	1.90	2.04	2.18	2.28	2.30	2.31	2.37	2.42	2.44	2.74	2.92	3.25	2.43
1916.....	3.42	3.61	3.64	3.40	3.18	3.09	3.10	3.02	2.97	2.92	2.95	3.14	3.20
1917.....	3.25	3.62	3.75	3.75	3.82	4.05	4.18	4.26	4.60	4.87	4.74	4.57	4.12
1918.....	4.48	4.49	.....	5.28	5.17	4.62	4.94	5.00	4.73	4.34	4.40	4.42	4.72
1919.....	4.42	4.42	4.10	4.08	4.08	3.86	2.97	2.94	2.88	2.91	3.01	3.02	3.56
1920.....	3.12	3.64	3.88	3.90	3.88	3.83	3.85	3.76	3.49	3.16	2.95	2.81	3.52
1921.....	2.80	2.88	2.69	2.69	2.84	2.59	2.36	2.11	2.17	2.32	2.26	2.30	2.50
1922.....	2.35	2.41	2.81	2.86	2.73	2.61	2.52	2.40	2.40	2.39	2.46	2.57	2.54
1923.....	2.60	2.59	2.64	2.66	2.58	2.46	2.44	2.43	2.42	2.45	2.43	2.51	2.52
1924.....	2.48	2.48	2.54	2.59	2.61	2.62	2.49	2.50	2.45	2.40	2.42	2.46	2.50
1925.....	2.60	2.67	2.68	2.65	2.64	2.55	2.48	2.47	2.52	2.56	2.60	2.64	2.59
1926.....	2.68	2.72	2.74	2.70	2.63	2.54	2.40	2.34	2.36	2.41	2.53	2.60	2.55
1927.....	2.62	2.64	2.67	2.65	2.61	2.75	2.42	2.25	2.29	2.39	2.42	2.42	2.51
1928.....	2.41	2.35	2.32	2.32	2.32	.....	.....	.....	.....	.....	.....	.....	.....

* From the *Oil, Paint and Drug Reporter.*

TABLE 23. Index Numbers of Wholesale Spot Prices of Nitrate of Soda in 100-Pound Bags, New York City, 1902 to 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1902	.....	101	104	107	95	94	90	85	85	85	88	92	93
1903	88	88	97	90	90	94	89	98	98	98	96	99	94
1904	98	97	97	101	98	94	96	96	97	99	103	107	99
1905	104	104	104	108	115	103	103	99	99	98	100	100	103
1906	98	98	99	99	100	100	101	106	111	115	115	115	105
1907	109	109	110	119	118	113	112	110	106	106	107	108	111
1908	107	108	107	101	100	100	100	101	98	96	97	99	101
1909	97	96	96	94	94	97	95	96	94	94	94	95	95
1910	93	93	95	94	92	93	93	94	94	96	96	97	94
1911	94	94	93	92	92	93	95	98	99	100	101	101	96
1912	98	98	98	103	106	108	109	111	113	114	114	116	108
1913	115	116	116	114	113	111	110	104	105	105	104	100	109
1914	98	99	99	97	97	96	93	93	89	85	85	86	93
1915	85	91	97	100	100	101	105	108	109	123	131	148	108
1916	152	161	162	149	138	136	137	135	133	131	132	143	142
1917	145	161	167	164	166	178	185	190	206	218	213	208	183
1918	200	200	.....	231	224	203	219	223	212	194	197	201	210
1919	197	197	182	178	177	169	132	131	129	130	135	137	158
1920	139	162	172	171	168	168	171	168	156	141	132	128	156
1921	125	128	120	118	123	114	105	94	97	104	101	104	111
1922	105	107	125	125	118	115	112	107	107	107	110	117	113
1923	116	115	117	116	112	108	108	109	108	110	109	114	112
1924	111	111	113	113	113	115	110	112	110	107	109	112	111
1925	116	119	119	116	114	112	110	110	113	114	117	120	115
1926	119	121	122	118	114	112	106	105	106	108	113	118	113
1927	117	118	119	116	113	121	107	101	102	107	109	110	112
1928	108	105	103	101	100	.....	.....	.....	.....	.....	.....	.....	.....

pre-war level in April, 1918 (table 23). This was not unusually high in view of the abnormal demand and the rise in the general price level. In September, 1919, prices of nitrate had declined to 129 per cent of the pre-war level, a drop of 102 points in seventeen months. After a recovery to 172 per cent of the pre-war level in March, 1920, the index number dropped to a low point of 94 in August, 1921. For the five years 1922 to 1926, prices of nitrate were relatively constant at about 113 per cent of pre-war prices.

For the five years 1922 to 1926, nitrate of soda was highest in price in March and April and lowest during August, September, and October (table 24). The consumption of nitrate is largest during the spring and

TABLE 24. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF NITRATE OF SODA

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1903–1913.....	99	99	100	102	103	100	99	99	100	100	100	100
1905–1909.....	100	100	100	103	105	101	100	99	98	98	98	98
1910–1914.....	100	100	100	102	103	101	100	100	99	99	99	98
1922–1926.....	100	101	106	106	104	101	97	96	96	96	98	101

early summer, when the product is used in mixed fertilizers and as a top-dressing for cotton.

Sulfate of ammonia

Sulfate of ammonia is the second important source of nitrogen for commercial fertilizers. It is a by-product of the coke industry of the United States. In 1923 and in 1921, approximately 99 per cent of the production was from this source (table 25, footnote).

TABLE 25. UNITED STATES PRODUCTION OF SULFATE OF AMMONIA, 1899 TO 1923*

		Amount	Index number (1914 = 100)
		(Pounds)	
Coke industry	1899	11,984,931	6
	1904	31,546,781	17
	1909	123,111,197	66
Coke, gas, and chemical industries†	1914	185,827,140	100
	1919	590,365,773	318
	1921	536,034,670	288
	1923	894,427,958	481

* Figures obtained by correspondence with the Department of Commerce, U. S. Bureau of the Census.
† The product of the coke industry was 99 per cent of the total in 1923, 99 per cent in 1921, 95 per cent in 1919, and 92 per cent in 1914.

TABLE 26. PRICES OF SULFATE OF AMMONIA PER 100 POUNDS, F. O. B. WORKS, 1897 TO 1928*

(Dollars per 100 pounds)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914.....	$3.03	$3.05	$3.08	$3.09	$3.06	$2.98	$2.93	$2.95	$3.03	$3.03	$3.02	$3.00	$3.02
1897.....	2.28	2.29	2.28	2.24	2.22	2.16	2.12	2.02	2.15	2.19	2.27	2.37	2.22
1898.....	2.40	2.59	2.53	2.39	2.40	2.52	2.51	2.56	2.62	2.56	2.63	2.65	2.53
1899.....	2.73	2.69	2.73	2.83	3.04	3.19	3.18	3.16	3.08	2.97	2.87	2.92	2.95
1900.....	2.97	3.02	3.11	3.03	2.91	2.87	2.81	2.86	2.79	2.80	2.80	2.81	2.90
1901.....	2.81	2.79	2.78	2.70	2.77	2.73	2.72	2.72	2.78	2.82	2.82	2.78	2.77
1902.....	2.84	2.95	2.96	3.02	3.08	3.11	3.03	2.93	3.04	2.98	2.96	3.04	3.00
1903.....	3.13	3.14	3.18	3.21	3.16	3.14	3.17	3.07	3.06	3.04	3.07	3.11	3.12
1904.....	3.22	3.21	3.21	3.17	3.31	3.06	3.04	2.99	3.00	3.03	3.11	3.19	3.13
1905.....	3.18	3.24	3.20	3.14	3.12	3.07	3.07	3.05	3.08	3.14	3.14	3.09	3.13
1906.....	3.11	3.10	3.09	3.11	3.11	3.09	3.07	3.07	3.09	3.10	3.18	3.13	3.10
1907.....	3.10	3.10	3.09	3.11	3.09	3.09	3.09	3.09	3.06	3.04	3.04	3.02	3.08
1908.....	3.02	3.04	3.06	3.11	3.08	3.02	3.01	3.01	2.71	2.89	2.89	2.85	2.97
1909.....	2.91	2.99	2.99	2.97	2.91	2.90	2.88	2.76	2.65	2.65	2.62	2.64	2.82
1910.....	2.73	2.74	2.84	2.81	2.82	2.79	2.79	2.79	2.88	2.92	2.94	2.96	2.83
1911.....	.....	3.12	3.14	3.11	3.08	3.04	3.08	3.15	3.16	3.18	3.18	3.20	3.13
1912.....	3.21	3.24	3.28	3.38	3.40	3.40	3.25	3.22	3.29	3.28	3.22	3.22	3.28
1913.....	3.28	3.30	3.30	3.30	3.30	3.12	3.00	2.98	3.05	3.10	3.06	2.95	3.14
1914.....	2.90	2.85	2.85	2.85	2.70	2.55	2.54	2.60	2.77	2.68	2.68	2.68	2.72
1915.....	2.68	2.96	3.16	3.11	3.20	3.22	3.42	3.51	3.38	3.38	3.57	3.94	3.29
1916.....	3.96	3.96	3.92	3.69	3.59	3.53	3.44	3.59	3.78	4.04	4.21	4.32	3.84
1917.....	4.12	4.18	.....	.....	4.72	4.80	4.90	4.90	4.92	4.95	4.92	4.90	4.73
1918.....	4.99	5.22	5.38	5.46	5.60	5.10	4.90	4.50	4.50	4.50	4.50	4.87	4.96
1919.....	4.68	4.50	4.25	4.00	3.80	3.60	3.40	3.53	3.53	3.57	3.78	3.93	3.88
1920.....	4.00	4.00	4.55	4.55	4.55	4.55	4.55	4.80	4.80	4.25	3.75	3.38	4.31
1921.....	3.38	3.12	2.92	2.58	2.45	2.45	2.35	2.00	1.95	2.20	2.20	2.20	2.48
1922.....	2.20	2.37	2.60	2.65	2.67	2.72	2.82	2.82	2.90	3.05	3.07	3.12	2.75
1923.....	3.10	3.16	3.20	3.22	3.22	3.14	3.10	3.07	3.02	3.01	2.94	2.76	3.08
1924.....	2.72	2.72	2.72	2.68	2.62	2.54	2.46	2.38	2.42	2.64	2.65	2.70	2.60
1925.....	2.67	2.62	2.55	2.52	2.42	2.38	2.48	2.71	2.78	2.90	2.88	2.82	2.64
1926.....	2.82	2.72	2.69	2.62	2.62	2.52	2.48	2.42	2.48	2.48	2.48	2.48	2.57
1927.....	2.48	2.50	2.51	2.48	2.42	2.40	2.29	2.32	2.38	2.38	2.40	2.42	2.42
1928.....	2.42	2.50	2.68	2.86	2.55	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of sulfate of ammonia for the years 1897 to 1916 and 1926 to 1928 were obtained from the *Oil, Paint and Drug Reporter*. For the years 1917 to 1925, the prices were obtained from the Barrett Company, 40 Rector Street, New York City.

TABLE 27. INDEX NUMBERS OF PRICES OF SULFATE OF AMMONIA, F. O. B. WORKS, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	75	75	74	72	73	72	72	68	71	72	75	79	73
1898	79	85	82	77	78	85	86	87	86	84	87	88	84
1899	90	88	89	92	99	107	109	107	102	98	95	97	98
1900	98	99	101	98	95	96	96	97	92	92	93	94	96
1901	93	91	90	87	91	92	93	92	92	93	93	93	92
1902	94	97	96	98	101	104	103	99	100	98	98	101	99
1903	103	103	103	104	103	105	108	104	101	100	102	104	103
1904	106	105	104	103	108	103	104	101	99	100	103	106	104
1905	105	106	104	102	102	103	105	103	102	104	104	103	104
1906	103	102	100	101	102	104	105	104	102	102	105	104	103
1907	102	102	100	101	101	104	105	105	101	100	101	101	102
1908	100	100	99	101	101	101	103	102	89	95	96	95	98
1909	96	98	97	96	95	97	98	94	87	87	87	88	93
1910	90	90	92	91	92	94	95	95	95	96	97	99	94
1911	.....	102	102	101	101	102	105	107	104	105	105	107	104
1912	106	106	106	109	111	114	111	109	109	108	107	107	109
1913	108	108	107	107	108	105	102	101	101	102	101	98	104
1914	96	93	93	92	88	86	87	88	91	88	89	89	90
1915	88	97	103	101	105	108	117	119	112	112	118	131	109
1916	131	130	127	119	117	118	117	122	125	133	139	144	127
1917	136	137	.....	.....	154	161	167	166	162	163	163	163	157
1918	165	171	175	177	183	171	167	153	149	149	149	162	164
1919	154	148	138	129	124	121	116	120	117	118	125	131	128
1920	132	131	148	147	149	153	155	163	158	140	124	113	143
1921	112	102	95	83	80	82	80	68	64	73	73	73	82
1922	73	78	84	86	87	91	96	96	96	101	102	104	91
1923	102	104	104	104	105	105	106	104	100	99	97	92	102
1924	90	89	88	87	86	85	84	81	80	87	88	90	86
1925	88	86	83	82	79	80	85	92	92	96	95	94	87
1926	93	89	87	85	86	85	85	82	82	82	82	83	85
1927	82	82	81	80	79	81	78	79	79	79	79	81	80
1928	80	82	87	93	83	.....	.....	.....	.....	.....	.....	.....	.....

In 1923, production was 4.8 times the 1914 production (table 25). The production in 1914 was about 15 times the production in 1899. The increase in output of sulfate of ammonia has been very rapid. This has been due primarily to the development of coke manufacture and to improved methods of utilizing the by-products of the industry.

The general trend of prices of sulfate of ammonia for the seventeen years 1897 to 1913 was slightly upward (table 26 and figure 8). Prices reached a peak of 183 per cent of the pre-war level in 1918 (table 27). Sulfate declined rapidly in price during deflation, and reached a low point of 64

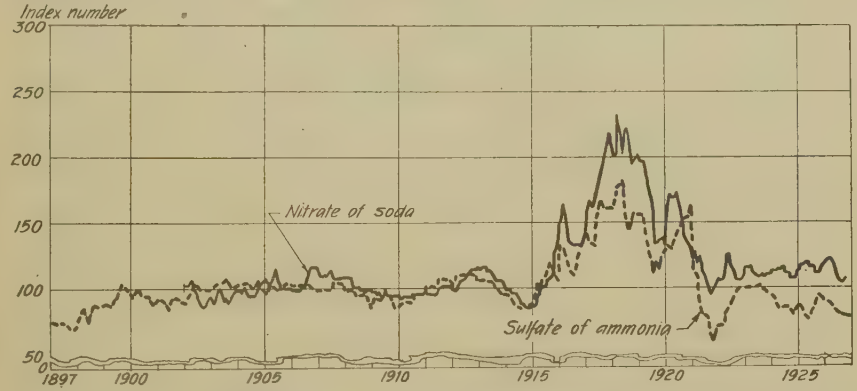

FIGURE 8. INDEX NUMBERS OF PRICES OF NITRATE OF SODA AND SULFATE OF AMMONIA, 1897 TO 1927

The price of sulfate of ammonia is below the pre-war level, whereas that of nitrate of soda is above

per cent of pre-war prices in September, 1921. For the five years 1922 to 1926, the price was relatively constant at 90 per cent of the pre-war level. The tremendous increase in production since 1914 has depressed the price of sulfate so that it is considerably below the prices of most commodities.

There is only a slight seasonal variation in the prices of sulfate of ammonia (table 28). Prior to the war, prices tended to be highest during

TABLE 28. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF SULFATE OF AMMONIA

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1897–1913.....	100	101	102	101	102	101	100	99	99	99	100	100
1900–1904.....	100	101	102	102	102	100	99	98	98	98	99	100
1905–1909.....	102	102	102	102	101	100	100	99	97	98	98	98
1910–1914.....	101	102	103	103	102	99	98	98	101	101	100	100
1922–1926.....	99	100	101	100	99	98	98	98	100	103	103	102

March and April. For the five years 1922 to 1926, however, prices were highest during October and November.

Index numbers of wholesale prices of mineral ammoniates

A weighted index number of the price of ammonia in mineral ammoniates was made from the prices of nitrate of soda and sulfate of ammonia.[3] The weights used in making the index were: nitrate of soda, 153,000 tons; sulfate of ammonia, 143,000 tons. The weights were obtained from the 1914 and the 1919 Census of Manufactures.

During the fourteen-year period 1902 to 1915, the prices of sulfate of ammonia and nitrate of soda moved more or less together. During the World War, however, the index of the price of nitrate of soda rose higher than did that for sulfate of ammonia. The peaks were 231 and 183, respectively. When compared with pre-war prices, sulfate of ammonia is now considerably cheaper than nitrate of soda. For the six years 1921 to 1926, sulfate of ammonia averaged 89 per cent, and nitrate of soda 112 per cent, of the pre-war level.

From 1897 to 1907, the index number of the price of mineral ammoniates rose from 74 to 106 (table 29). Prices were high during the World War,

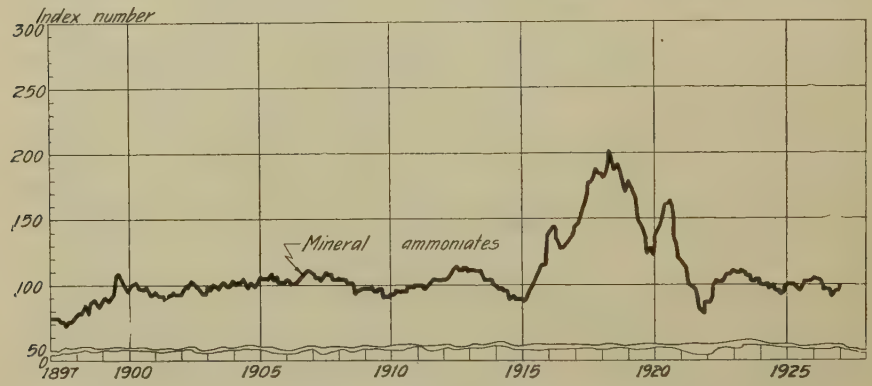

FIGURE 9. INDEX NUMBERS OF MINERAL AMMONIATES, 1897 TO 1927

Mineral ammoniates are at pre-war prices

when there was a large demand by war industries for nitrate of soda. In April and May of 1918, mineral ammoniates were at 201 per cent of pre-war prices. When the United States entered the war, the Government assumed complete control of the explosive industry. With deflation, prices declined, reaching a low point, 79 per cent of the pre-war level, in September, 1921. For the five years 1922 to 1926, the index number was relatively constant at about the pre-war level.

[3] Prices for both series were not available for the entire period from 1897 to 1928. The mineral-ammoniates index is based on the prices of sulfate of ammonia for the sixty-one months from January, 1897, to January, 1902, inclusive.

TABLE 29. INDEX NUMBERS OF PRICES OF MINERAL AMMONIATES, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	75	75	74	72	73	72	72	69	71	72	75	79	74
1898	79	85	82	77	78	85	86	87	86	84	87	88	84
1899	90	88	89	92	99	107	108	107	102	98	95	97	98
1900	98	99	101	98	95	96	96	97	92	92	93	94	96
1901	93	91	90	87	91	92	93	92	92	93	94	93	92
1902	94	99	99	102	98	100	97	93	93	92	94	97	97
1903	96	96	100	98	97	100	100	101	100	99	99	102	99
1904	102	101	101	102	104	99	100	99	98	99	103	106	101
1905	104	105	104	105	108	103	104	101	101	101	102	102	103
1906	100	100	100	100	101	102	103	105	106	108	110	109	104
1907	105	105	104	109	109	108	108	107	103	103	103	104	106
1908	103	103	102	101	100	101	101	101	93	95	96	97	100
1909	96	97	97	95	95	97	97	95	90	90	90	91	94
1910	91	91	93	92	92	93	94	94	95	96	97	98	94
1911	98	98	98	97	97	98	101	103	102	103	103	104	100
1912	103	103	103	107	109	111	110	110	110	111	110	111	108
1913	111	112	111	110	110	107	106	102	102	104	102	99	106
1914	97	96	95	94	92	90	89	90	90	87	87	88	91
1915	87	94	100	100	102	105	111	114	110	116	124	138	108
1916	140	144	142	132	126	126	126	128	128	132	136	143	134
1917	140	148	.....	.....	159	169	175	177	182	187	185	183	168
1918	180	184	.....	201	201	185	190	184	176	169	171	179	184
1919	173	169	157	151	148	143	123	125	122	124	130	134	142
1920	135	145	158	158	157	160	162	165	157	141	128	119	149
1921	117	114	106	99	99	96	91	80	79	86	86	87	95
1922	87	91	102	103	101	102	103	101	101	103	106	110	101
1923	108	109	110	110	108	107	107	106	103	104	103	102	106
1924	99	99	99	98	98	99	96	95	93	96	97	100	97
1925	100	100	99	97	95	94	96	100	101	104	105	105	100
1926	105	103	102	100	98	97	94	92	92	93	96	98	98
1927	97	98	98	96	94	98	91	88	89	91	92	93	94
1928	92	92	94	97	91	.....	.....	.....	.....	.....	.....	.....	.....

Organic ammoniates

The nitrogen in commercial fertilizers is obtained from the mineral, or inorganic, ammoniates, nitrate of soda and sulfate of ammonia, and also from the organic ammoniates, cottonseed meal, tankage, blood, fish scrap, and cyanamid. The mineral ammoniates are readily soluble in water. The nitrogen from such materials is available for the plant soon after the fertilizer is applied, but ordinarily it lasts for only a comparatively short time. This is especially true when the rainfall is heavy.

The nitrogen from organic ammoniates, however, becomes available more slowly and over a longer period. Since the plant requires nitrogen throughout the growing season, a fertilizer which contains a mixture of both inorganic and organic ammoniates supplies the plant requirements better than does a fertilizer which contains nitrogen from only one source. The mineral nitrogen becomes available quickly and gives the young plant a good, vigorous start, while the nitrogen from the organic materials becomes available later and tends to carry the plant on to maturity.

The organic ammoniates also act as a drier in commercial fertilizer. They tend to absorb the moisture from the other materials, and help maintain a satisfactory mechanical condition of the mixture.

Cottonseed meal

At the present time, cottonseed meal is used both for feeding purposes and for fertilizer. It contains from 4 to 8 per cent of nitrogen, about 2.9 per cent of phosphoric acid, and 1.8 per cent of potash. It is a complete fertilizer in itself. The Federal Trade Commission, in its report issued in 1916 on the fertilizer industry,[4] estimated that about 33 per cent of the production of cottonseed cake and meal was used for fertilizer. Before cottonseed meal came into common use as a feed for livestock it was used primarily as fertilizer. The high nitrogen content of cottonseed meal, however, makes it a valuable protein supplement for the carbonaceous feeds commonly fed to cattle.

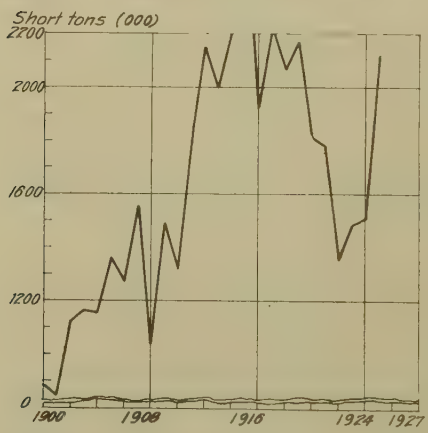

FIGURE 10. COTTONSEED-CAKE AND -MEAL PRODUCTION, 1900 TO 1925

From 1915 to 1922, production declined. This corresponds with the reduced cotton crops

The production of cottonseed cake and meal in the United States for the twenty-seven years 1900 to 1926 is presented in table 30.

[4] Federal Trade Commission Report on the Fertilizer Industry, August 19, 1916, page 59.

TABLE 30. COTTONSEED-CAKE AND -MEAL PRODUCTION IN THE UNITED STATES, 1900 TO 1926*

Year	Production of cottonseed cake and meal	Year	Production of cottonseed cake and meal
	(Thousands of short tons)		(Thousands of short tons)
1900	884	1914	2,220
1901	845	1915	2,648
1902	1,125	1916	1,923
1903	1,165	1917	2,225
1904	1,156	1918	2,068
1905	1,360	1919	2,170
1906	1,272	1920	1,817
1907	1,563	1921	1,786
1908	1,043	1922	1,355
1909	1,492	1923	1,487
1910	1,326	1924	1,518
1911	1,792	1925	2,125
1912	2,151	1926	2,597
1913	1,999		

* Agriculture yearbook (U. S. Dept. Agr.) 1924, page 764; Agriculture yearbook 1926, page 978.

For the pre-war period, 1900 to 1913, the production increased at a rate of 87,345 tons per annum, or 6.12 per cent. The fluctuations from year to year in cottonseed-cake and -meal output are primarily due to variations in the size of the cotton crop.

The general trend of production for the eight years 1915 to 1922 was sharply downward, due to a general decline in the size of the cotton crops. The large cotton crop of 1925 was accompanied by an increase in the production of cottonseed cake and meal.

The index number of the wholesale price of cottonseed meal increased from 64 in 1897 to 104 in 1913 (table 32). The average yearly increase in the index was 2.6 points. During this same period, the trend in the price of superphosphate (acid phosphate) was downward, while the price of mineral ammoniates remained comparatively constant. Cottonseed-meal prices reached a peak of 274 per cent of the pre-war level in November, 1919. They declined rapidly during the latter part of 1920, and reached a low point, 120 per cent of the pre-war level, in April, 1921 — a decline of 154 points in seventeen months. The price recovered to 168 per cent of the pre-war level in 1923. For the five years 1922 to 1926, the price averaged 153 per cent of the pre-war level. The large cotton crops of 1925 and 1926 were accompanied by declines in the price of cottonseed meal. In December, 1926, the price was 110 per cent of the pre-war prices.

These index numbers, which are based on New York City prices, probably represent the price of cottonseed meal used on tobacco in the Connecticut

TABLE 31. WHOLESALE PRICES OF COTTONSEED MEAL, 43 PER CENT PROTEIN, IN SACKS, IN STRAIGHT CARS, NEW YORK CITY, 1897 TO 1928*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897–1913.....	$26.96	$26.69	$26.68	$26.78	$26.77	$27.02	$27.28	$27.77	$27.97	$27.53	$27.45	$27.39	$27.20
1909–1913.....	31.16	30.86	30.70	31.52	31.76	32.09	32.31	33.31	33.17	32.02	31.86	31.77	31.88
1910–1914.....	32.02	31.25	31.03	31.72	31.92	31.96	32.11	33.34	33.19	31.16	30.72	30.73	31.76
1897.....	19.76	20.00	20.00	19.65	19.07	19.37	19.45	20.51	21.45	21.19	21.39	20.99	20.24
1898.....	20.16	20.34	20.48	19.95	20.39	19.85	19.81	20.22	20.00	20.00	20.00	19.89	20.09
1899.....	20.14	20.06	20.06	20.00	20.00	20.00	20.00	20.34	21.09	21.00	21.00	21.00	20.39
1900.....	21.00	21.41	22.18	22.00	22.00	21.46	22.00	27.66	25.96	25.40	25.50	25.10	23.19
1901.....	25.00	24.34	24.51	24.18	22.46	22.98	23.76	25.14	25.65	25.20	24.30	25.60	24.42
1902.....	28.04	27.32	25.28	26.46	29.36	28.31	28.86	28.78	26.55	27.29	28.50	28.50	27.78
1903.....	27.00	26.55	26.81	26.68	25.48	26.24	26.06	26.00	26.00	26.62	25.44	25.60	26.20
1904.....	26.92	26.80	26.95	25.01	25.00	24.75	25.65	26.02	26.68	26.61	26.75	26.75	26.16
1905.....	25.95	26.00	27.77	27.46	26.00	26.00	25.75	25.54	26.00	26.50	26.50	26.50	26.33
1906.....	30.00	29.80	30.05	30.34	30.34	30.89	30.89	30.89	30.40	28.41	29.40	29.16	30.05
1907.....	29.40	28.41	28.17	27.42	26.42	28.83	28.83	29.32	30.17	30.39	28.96	28.71	28.75
1908.....	29.12	28.34	27.85	28.59	29.69	30.17	31.15	30.17	29.71	29.32	29.56	29.07	29.39
1909.....	28.69	29.06	30.00	32.04	32.41	33.99	33.99	32.90	32.63	33.83	33.99	34.19	32.31
1910.....	35.45	35.27	34.43	33.39	32.90	32.34	31.20	32.63	32.61	31.02	30.48	29.92	32.64
1911.....	29.69	28.64	27.66	28.47	28.59	29.44	30.05	32.14	31.26	31.15	30.10	30.05	29.77
1912.....	30.24	30.90	31.26	32.48	32.92	32.24	31.95	31.75	32.24	31.75	31.75	31.75	31.77
1913.....	31.75	30.42	30.17	31.22	31.99	32.42	34.38	37.11	37.11	32.36	32.97	32.92	32.90
1914.....	32.97	31.02	31.63	33.02	33.21	33.36	32.99	33.09	32.72	29.51	28.28	29.02	31.74
1915.....	29.93	32.02	32.22	32.32	31.71	30.90	31.22	31.71	31.97	35.12	35.33	38.26	33.21
1916.....	38.40	36.45	35.68	35.97	34.70	34.45	34.26	35.45	37.92	39.26	44.96	45.10	37.72
1917.....	44.00	43.52	41.45	43.46	44.68	46.90	51.28	52.69	51.89	52.40	55.42	56.88	48.72
1918.....	54.08	54.69	53.86	54.08	52.98	52.30	54.59	55.00	66.85	65.71	67.34	68.11	58.30
1919.....	67.03	67.03	67.86	70.18	68.92	72.95	83.47	90.69	80.12	78.54	84.28	83.33	76.20
1920.....	83.54	82.68	78.07	74.26	79.86	79.00	72.60	67.49	65.58	56.88	49.62	41.76	69.28
1921.....	41.46	39.41	38.50	38.18	41.24	41.84	48.60	49.57	49.57	48.99	47.38	49.82	44.55
1922.....	47.73	50.30	54.99	57.39	59.29	57.39	52.88	45.43	44.44	48.86	55.11	55.66	52.46
1923.....	55.15	53.98	53.81	52.70	52.84	50.94	51.93	50.70	53.10	53.37	56.65	54.38	53.29
1924.....	52.91	50.12	49.31	48.74	48.94	51.78	53.85	53.40	50.72	50.29	48.58	47.97	50.55
1925.....	47.22	45.53	45.42	46.15	47.93	48.53	51.17	54.18	49.55	44.34	43.26	42.93	47.19
1926.....	42.12	41.34	40.38	40.36	40.42	40.52	41.28	40.15	38.60	34.33	33.60	33.90	38.92
1927.....	37.25	40.42	41.64	40.55	42.64	45.81	45.10	44.80	45.87	46.39	48.50	50.87	44.16
1928.....	53.37	54.40	57.83	62.83	68.86	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of cottonseed meal for 1897 to 1905, inclusive, were tabulated from the statistical reports of the New York Produce Exchange. Prices per hundredweight from 1897 to 1905 were multiplied by 20. For the nine years 1897 to 1905, the New York City price was 97.395 per cent of the Utica price, as published in *Farm Economics*, no. 35, page 479, June, 1926. The prices of cottonseed meal here given for the years 1906 to 1928 are 97.4 per cent of the Utica price.

TABLE 32. INDEX NUMBERS OF WHOLESALE PRICES OF COTTONSEED MEAL, 43 PER CENT PROTEIN, IN SACKS, IN STRAIGHT CARS, NEW YORK CITY, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	62	64	64	62	60	61	61	62	65	68	70	68	64
1898	63	65	66	63	64	62	62	61	60	64	65	65	63
1899	63	64	64	63	63	63	62	61	64	67	68	68	64
1900	66	69	71	69	69	67	69	68	78	82	83	82	73
1901	78	78	79	76	70	72	74	75	77	81	79	83	77
1902	88	87	81	83	92	89	90	86	80	88	93	93	87
1903	84	85	86	84	80	82	81	78	78	85	83	83	82
1904	84	86	87	79	78	77	80	78	80	85	87	87	82
1905	81	83	89	87	81	81	80	77	78	85	86	86	83
1906	94	95	97	96	95	97	96	93	92	91	96	95	95
1907	92	91	91	86	83	90	90	88	91	98	94	93	91
1908	91	91	90	90	93	94	97	90	90	94	96	95	93
1909	90	93	97	101	102	106	106	99	98	109	111	111	102
1910	111	113	111	105	103	101	97	98	98	100	99	97	103
1911	93	92	89	90	90	92	94	96	94	100	98	98	94
1912	94	99	101	102	103	101	100	95	97	102	103	103	100
1913	99	97	97	98	100	101	107	111	112	104	107	107	104
1914	103	99	102	104	104	104	103	99	99	95	92	94	100
1915	93	102	104	102	99	97	97	95	96	113	115	125	105
1916	120	117	115	113	109	108	107	106	114	126	146	147	119
1917	137	139	134	137	140	147	160	158	156	168	180	185	153
1918	169	175	174	170	166	164	170	165	201	211	219	222	184
1919	209	214	219	221	216	228	260	272	241	252	274	271	240
1920	261	265	252	234	250	247	226	202	198	183	162	136	218
1921	129	126	124	120	129	131	151	149	149	157	154	162	140
1922	149	161	177	181	186	180	165	136	134	157	179	181	165
1923	172	173	173	166	166	159	162	152	160	171	184	177	168
1924	165	160	159	154	153	162	168	160	153	161	158	156	159
1925	147	146	146	145	150	152	159	163	149	142	141	140	149
1926	132	132	130	127	127	127	129	120	116	110	109	110	123
1927	116	129	134	128	134	143	140	134	138	149	158	166	139
1928	167	174	186	198	216	.....	.....	.....	.....	.....	.....	.....	.....

River Valley. For the South, however, these index numbers are probably somewhat high. The New York price includes transportation charges, handling charges, and the like, which are not so large a part of the price at southern points. As freight rates and wages are high at the present time, there is a wider spread between the prices at New York City and southern points than existed before the war.

For the five years 1910 to 1914, prices were highest in August and September and lowest in October, November, and December (table 33). Prices tended to be highest just before the new crop became available.

TABLE 33. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF COTTONSEED MEAL

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1897–1913.....	100	99	99	100	99	100	100	102	102	100	100	99
1900–1904.....	100	99	101	100	97	97	99	101	103	102	101	100
1905–1909.....	97	96	97	98	99	102	103	101	102	101	102	102
1910–1914.....	101	98	98	100	101	101	100	105	105	97	97	97
1921–1925.....	99	97	98	98	101	101	104	102	100	99	101	100

Tankage

Animal tankage is a by-product of the packing industry. Tankage contains a high percentage of protein (about 40 per cent) and is used extensively as a protein supplement for feeding hogs. Some is used, however, in making fertilizer. The production of tankage in the United States was estimated from the yield of tankage per animal slaughtered, as reported by Swift and Company (table 34), and the receipts of cattle, hogs, and sheep at the nine principal markets.

TABLE 34. YIELD OF TANKAGE PER ANIMAL SLAUGHTERED (SWIFT & COMPANY)

Class of livestock	Pounds of tankage per head
Cattle	14.0
Calves	3.0
Hogs	7.0
Sheep	1.5

The production of tankage increased at the rate of 1644 tons a year for the fifteen-year period 1900 to 1914. This is a percentage increase of 1.22 per cent. The yearly increase in the tonnage of cottonseed cake and meal was 87,345 tons, or a yearly increase of 6.12 per cent. The production of cottonseed meal increased much faster than did that of tankage.

The tonnage of tankage produced is more constant from year to year than is that of cottonseed meal. Due to the weather, the acreage planted,

and boll-weevil damage, the cotton crop varies greatly. While the receipts of livestock at the markets vary from year to year, they do not fluctuate so violently as does the cotton crop, and so tankage production is more constant.

The production of tankage seems to show some cyclical movement. There were peaks in 1908, 1911, 1918, and 1924 (table 35 and figure 11). Hog receipts also reached high points in these years. Since about half of the tankage is produced from hogs, the production of tankage tends to fluctuate with hog receipts.

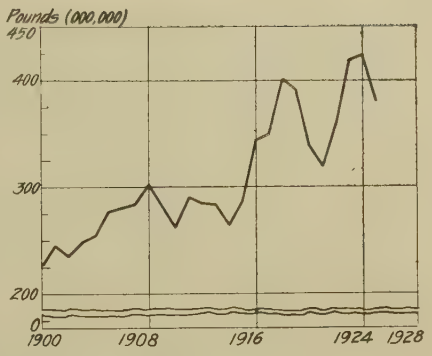

FIGURE 11. TANKAGE PRODUCTION, 1900 TO 1925
There has been a general increase in production of tankage

TABLE 35. PRODUCTION OF TANKAGE, 1900 TO 1925

Year	Production of tankage	Year	Production of tankage
	(Thousands of pounds)		(Thousands of pounds)
1900	227,859	1913	286,488
1901	248,379	1914	264,818
1902	243,055	1915	288,130
1903	250,598	1916	346,141
1904	255,226	1917	349,873
1905	278,631	1918	402,240
1906	279,573	1919	393,983
1907	285,189	1920	342,109
1908	302,631	1921	321,082
1909	282,673	1922	360,053
1910	263,155	1923	420,406
1911	291,861	1924	424,780
1912	285,973	1925	381,272

The prices of ammonia in tankage for the twenty-three years 1904 to 1926 are given in table 36. The general trend of prices for the pre-war period, 1904 to 1914, was decidedly upward. With inflation, prices increased, reaching a peak of 291 per cent of pre-war prices in July, 1920 (table 37). In August, 1921, the price had declined to 73 per cent of the pre-war level, a decline of 218 points in thirteen months. These violent changes in prices caused severe losses. The price recovered somewhat, and for the five years 1922 to 1926 it averaged 126 per cent of the pre-war level.

TABLE 36. PRICES OF AMMONIA IN TANKAGE, 11 PER CENT AMMONIA AND 15 PER CENT BONE PHOSPHATE, IN BULK, PER UNIT,* CHICAGO, 1904 TO 1928 †

(Dollars per unit)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914.....	$2.81	$2.84	$2.85	$2.85	$2.75	$2.70	$2.65	$2.74	$2.77	$2.79	$2.82	$2.85	$2.78
1904.....	2.18	2.20	2.20	2.15	2.10	2.10	2.15	2.16	2.21	2.27	2.38	2.40	2.21
1905.....	2.35	2.26	2.15	2.12	2.12	2.15	2.18	2.22	2.25	2.25	2.29	2.30	2.22
1906.....	2.30	2.35	2.47	2.40	2.38	2.32	2.26	2.27	2.35	2.39	2.46	2.52	2.37
1907.....	2.59	2.66	2.70	2.70	2.65	2.62	2.55	2.55	2.46	2.40	2.36	2.26	2.54
1908.....	2.24	2.20	2.02	2.01	2.02	2.05	2.19	2.28	2.30	2.30	2.30	2.30	2.18
1909.....	2.30	2.30	2.28	2.31	2.32	2.32	2.39	2.40	2.40	2.36	2.53	2.67	2.38
1910.....	2.79	2.78	2.80	2.99	2.78	2.58	2.58	2.71	2.80	2.87	2.95	2.88	2.79
1911.....	2.88	2.98	2.86	2.69	2.62	2.75	2.74	2.69	2.73	2.74	2.72	2.63	2.75
1912.....	2.55	2.55	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.68
1913.....	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.79	3.08	2.74
1914.....	3.12	3.18	3.18	3.18	2.96	2.75	2.51	2.88	2.91	2.95	2.95	2.95	2.96
1915.....	2.95	2.95	2.95	2.95	2.80	2.20	2.20	2.20	2.20	2.20	3.16	3.20	2.66
1916.....	3.18	3.05	3.00	2.85	2.85	2.85	2.78	2.91	3.08	3.22	3.45	3.84	3.09
1917.....	3.92	4.18	4.25	4.38	4.66	5.34	6.04	6.40	6.09	5.94	5.92	6.26	5.28
1918.....	6.56	6.51	6.46	6.42	6.60	6.61	6.67	6.78	6.77	6.90	6.81	6.56	6.64
1919.....	6.18	5.12	4.90	4.91	5.00	4.66	5.10	6.40	6.88	6.75	6.94	7.08	5.83
1920.....	7.25	7.50	8.20	8.00	7.90	7.50	7.69	7.50	7.06	6.69	4.45	3.05	6.90
1921.....	2.94	2.88	2.75	2.75	2.50	2.12	2.00	2.00	2.42	2.90	2.50	2.75	2.54
1922.....	3.29	3.46	4.50	3.56	2.69	2.96	4.30	4.50	4.31	4.05	4.50	4.81	3.91
1923.....	5.00	4.88	4.75	3.65	2.94	3.24	3.25	3.22	3.29	4.18	3.86	3.14	3.78
1924.....	2.72	2.62	2.62	2.53	2.22	2.32	2.75	3.66	3.80	3.44	3.50	3.42	2.97
1925.....	3.10	3.10	3.09	3.05	3.05	2.88	3.39	3.45	3.50	3.71	3.62	3.34	3.27
1926.....	3.25	3.25	3.25	3.25	3.25	3.44	4.06	4.05	4.00	3.75	3.75	3.75	3.59
1927.....	3.75	3.75	3.75	3.75	3.60	3.08	3.25	3.29	3.39	3.53	3.75	3.85	3.56
1928.....	3.85	3.85	3.85	3.85	3.85	.....	.....	.....	.....	.....	.....	.....	.....

* One unit equals 1 per cent per ton of 2000 pounds.

† Prices of ammonia in tankage were obtained from the *Oil, Paint and Drug Reporter*. For the period from January, 1904, to March, 1906, the quotations were for tankage 10 to 11 per cent ammonia and 10 to 15 per cent bone phosphate.

TABLE 37. INDEX NUMBERS OF PRICES OF AMMONIA IN TANKAGE, 11 PER CENT AMMONIA AND 15 PER CENT BONE PHOSPHATE, IN BULK, PER UNIT, CHICAGO, 1904 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1904	78	78	77	75	76	78	81	79	80	81	84	84	79
1905	84	80	75	74	77	80	82	81	81	81	81	81	80
1906	82	83	87	84	86	86	85	83	85	86	87	88	85
1907	92	94	95	95	96	97	96	93	89	86	84	79	91
1908	80	78	71	70	73	76	83	83	83	82	82	81	78
1909	82	81	80	81	84	86	90	88	87	85	90	94	85
1910	99	99	98	105	101	96	98	99	101	103	105	101	100
1911	103	105	100	94	95	102	104	98	99	98	96	92	99
1912	91	90	95	95	98	100	102	99	98	97	96	95	96
1913	96	95	95	95	98	100	102	99	98	97	99	108	98
1914	111	112	112	112	108	102	95	105	105	106	105	104	106
1915	105	104	104	103	102	82	83	80	79	79	112	112	96
1916	113	107	105	100	104	106	105	106	111	115	122	135	111
1917	140	147	149	154	169	198	228	234	220	213	210	220	190
1918	234	229	227	225	240	245	252	248	245	247	241	230	239
1919	220	180	172	172	182	173	193	234	249	242	246	249	209
1920	258	264	288	281	287	278	291	274	255	240	158	107	248
1921	105	101	97	96	91	79	76	73	87	104	89	97	91
1922	117	122	158	125	98	110	163	164	156	145	159	169	140
1923	178	172	167	128	107	120	123	118	119	150	137	110	136
1924	97	92	92	89	81	86	104	134	137	123	124	120	107
1925	110	109	108	107	111	107	128	126	126	133	128	117	117
1926	116	114	114	114	118	127	153	148	144	134	133	132	129
1927	133	132	132	132	131	114	123	120	122	127	133	135	128
1928	137	136	135	135	140	.....	.....	.....	.....	.....	.....	.....	.....

In the pre-war period, ammonia in tankage tended to be slightly higher in price during the winter months than during the summer months (table 38). For the five years 1922 to 1926, this tendency for prices to be low in

TABLE 38. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF AMMONIA IN TANKAGE

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1904–1913.....	100	100	100	100	98	98	98	99	100	100	102	104
1905–1909.....	101	101	99	99	98	98	99	100	100	100	102	103
1910–1914.....	101	102	102	102	99	97	95	98	99	100	101	102
1922–1926.....	99	99	104	92	81	85	101	108	108	109	110	105

the summer months seems to have been much greater. The index number of seasonal variation for May was 81 during the years 1922 to 1926, as compared with 99 for the years 1910 to 1914. This extreme low point in May was due to large declines in the quoted prices in May for the two years 1922 and 1923. In 1924 the decline was small, and in 1925 and 1926 there were no declines in May. Since tankage can be stored easily, it does not seem probable that a violent drop in May would ordinarily occur.

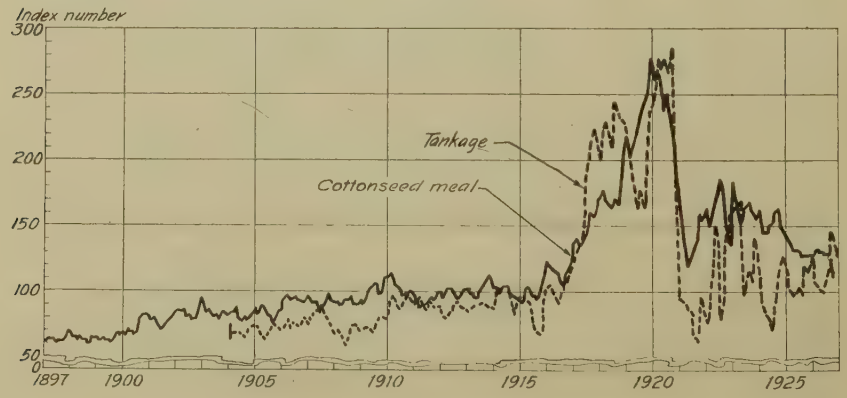

FIGURE 12. INDEX NUMBERS OF PRICES OF COTTONSEED MEAL AND TANKAGE, 1897 TO 1927

During the seventeen years from 1897 to 1913, there was a general upward trend in the prices of cottonseed meal and tankage. Unlike most fertilizer ingredients, since the war these have been above pre-war prices

Blood

Blood is used to some extent in fertilizer. Prices and the index numbers of prices of ammonia in blood are given in the appendix. While prices of tankage and of blood move more or less together, at times there is some disparity.

Fish scrap

Fish scrap is one of the important organic ammoniates. It is the residue obtained after extracting the oil from menhaden and other varieties of fish. It is made also from the waste products of fish canning. Data on the production of fish scrap as reported by the *Agriculture Yearbook 1925* are given in table 39. These data do not agree with the 1919 Census of

TABLE 39. PRODUCTION OF FISH SCRAP IN ATLANTIC AND GULF COAST DISTRICTS, 1912 TO 1924*

Year	Fish scrap† acidulated	Fish scrap‡ dried	Total
	(Short tons)	(Short tons)	(Short tons)
1912	12,838	65,660	78,498
1913	33,587	34,522	68,009
1914	17,985	24,205	42,190
1915	10,374	21,414	31,788
1916	14,525	22,458	36,983
1917	17,661	20,825	38,486
1918	33,187	16,047	49,234
1919	47,070	15,103	62,173
1920	49,600	19,990	69,590
1921	55,558	27,210	82,768
1922	46,710	29,277	75,987
1923	52,605	38,780	91,385
1924	.....	.....	45,951

* Agriculture Yearbook 1925, pages 1416–1417.
† Production in the North, North Carolina, Florida, Texas, and Georgia.
‡ Production in the North, Chesapeake, North Carolina, and Florida.

Manufactures, which reports 273,252 and 250,110 tons of fish used in the fertilizer industry in 1919 and 1914, respectively.

For the four years 1912 to 1915, production declined. For the nine years 1915 to 1923, however, there was a general increase in output.

The index numbers of the prices of ammonia in dried fish scrap increased from 84 in 1904 to 109 in 1911 (table 41). In 1912 and 1913, prices were low, being only 91 and 86 per cent, respectively, of the 1910–1914 average. The general upward trend in prices of fish scrap during the ten years prior to the war was similar to the trend of prices of most biological products. This was a period in which the general price level increased. Some manufactured commodities, however, declined in price during this period.

The peak of fish-scrap prices, reached in May, 1920, was 288 per cent of the pre-war level. Fifteen months later (August, 1921) it was only 86 per cent of pre-war prices, the index number having declined 202 points. The changes in the price of fish scrap and of tankage during this period were much the same. Tankage dropped 218 points in thirteen months.

TABLE 40. PRICES OF AMMONIA IN FISH SCRAP, 11 PER CENT AMMONIA AND 15 PER CENT BONE PHOSPHATE, IN BULK, PER UNIT, F. O. B. WORKS, 1904 TO 1928*

(Dollars per unit)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910-1914	$2.92	$2.92	$2.94	$2.83	$2.85	$2.72	$2.86	$2.84	$2.98	$3.06	$3.01	$3.04	$2.91
1904	2.49	2.53	2.45	2.40	2.40	2.40	2.40	2.40	2.46	2.50	2.51	2.59	2.46
1905	2.60	2.60	2.50	2.43	2.38	2.39	2.42	2.49	2.50	2.50	2.55	2.60	2.50
1906	2.60	2.60	2.52	2.32	2.60	2.56	2.55	2.55	2.55	2.55	2.55	2.61	2.55
1907	2.65	2.65	2.65	2.65	2.95	2.95	2.95	.....	2.80	2.80	2.80	2.80	2.79
1908	2.80	2.80	2.48	2.25	2.40	2.48	2.58	2.60	2.70	2.85	2.70	2.62	2.60
1909	2.68	2.71	2.70	2.62	2.55	2.59	2.65	2.58	2.57	2.58	2.66	2.76	2.64
1910	2.85	2.89	2.94	2.96	2.87	2.91	2.92	2.92	2.97	3.12	3.12	.....	2.95
1911	.....	.....	.....	.....	2.96	3.08	3.16	3.24	3.25	3.25	3.23	3.22	3.17
1912	3.21	3.20	3.20	2.75	2.80	2.71	2.40	2.40	2.50	2.50	2.12	2.00	2.65
1913	2.00	2.00	2.00	2.00	2.00	2.00	.....	2.66	2.95	3.10	3.22	3.60	2.50
1914	3.60	3.60	3.60	3.60	3.60	2.90	2.98	3.00	3.21	3.35	3.35	3.35	3.34
1915	3.35	3.35	3.35	3.35	3.35	.....	2.68	2.65	2.68	3.00	3.70	3.75	3.20
1916	3.75	3.75	3.75	3.75	3.75	3.56	3.02	3.38	3.58	3.70	4.31	4.50	3.73
1917	4.50	4.50	4.50	4.50	4.50	4.50	4.90	6.50	6.55	6.59	6.66	.....	5.29
1918	.....	.....	.....	.....	7.08	7.08	7.31	7.25	7.25	7.25	7.25	7.25	7.22
1919	7.25	.....	.....	.....	.....	5.46	5.48	6.78	8.36	6.60	6.76	6.89	6.70
1920	7.32	.....	.....	.....	8.19	7.67	7.56	7.50	7.12	5.95	4.63	3.65	6.62
1921	3.70	3.62	3.50	3.31	3.02	3.00	2.71	2.44	2.90	3.51	3.35	3.12	3.18
1922	3.25	3.41	3.50	.....	3.61	3.42	3.93	3.98	3.89	3.83	4.28	5.10	3.84
1923	.....	.....	.....	.....	4.00	3.78	3.75	3.82	3.82	4.00	4.18	4.50	3.98
1924	.....	.....	4.33	3.81	3.44	3.15	3.29	3.99	4.80	4.75	4.85	4.98	4.14
1925	5.00	4.80	4.60	4.34	4.06	4.05	4.35	4.63	4.50	4.25	4.02	4.19	4.40
1926	4.25	4.25	.....	4.12	4.25	4.01	3.80	3.88	4.00	4.02	4.16	4.15	4.08
1927	4.15	.....	.....	.....	4.29	4.06	4.47	4.65	5.10	5.42	5.60	5.78	4.84
1928	5.90	5.90	5.90	5.10	5.21	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of ammonia in fish scrap were obtained from the *Oil, Paint and Drug Reporter*. For the years 1904 to 1908, the quotations were for fish scrap 10 per cent ammonia and 14 per cent bone phosphate. For the years 1909 to 1919, the quotations were for fish scrap 11 per cent ammonia and 14 per cent bone phosphate.

TABLE 41. Index Numbers of Prices of Ammonia in Fish Scrap, 11 Per Cent Ammonia and 15 Per Cent Bone Phosphate, in Bulk, per Unit, F. O. B. Works, 1904 to 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1904	85	87	83	85	84	88	84	84	83	82	83	85	84
1905	89	89	85	86	84	88	84	88	84	82	85	85	86
1906	89	89	86	82	91	94	89	90	86	83	85	86	88
1907	91	91	90	94	104	108	103	.....	94	91	93	92	96
1908	96	96	84	80	84	91	90	91	91	93	90	86	89
1909	92	93	92	93	90	95	92	91	86	84	88	91	91
1910	98	99	100	105	101	107	102	103	100	102	104	.....	101
1911	.....	.....	.....	.....	104	113	110	114	109	106	107	106	109
1912	110	110	109	97	98	100	84	84	84	82	70	66	91
1913	69	68	68	71	70	74	.....	94	99	101	107	118	86
1914	123	123	123	127	126	107	104	105	108	109	111	110	115
1915	115	115	114	118	118	.....	94	93	90	98	123	123	110
1916	129	128	128	133	132	131	105	119	120	121	143	148	128
1917	154	154	153	159	158	165	171	229	220	215	221	.....	182
1918	.....	.....	.....	.....	249	260	255	255	244	237	241	238	248
1919	249	.....	.....	.....	.....	201	191	238	281	215	225	226	230
1920	251	.....	.....	.....	288	282	264	264	239	194	154	120	227
1921	127	124	119	117	106	110	95	86	97	115	111	103	109
1922	111	117	119	.....	127	126	137	140	131	125	142	168	132
1923	.....	.....	.....	.....	141	139	131	134	128	131	139	148	137
1924	.....	.....	148	135	121	116	115	140	161	155	161	164	142
1925	172	164	157	153	143	149	152	163	151	139	134	138	151
1926	146	146	.....	146	149	147	133	137	134	131	138	137	140
1927	142	.....	.....	.....	151	149	156	164	171	177	186	190	166
1928	202	202	201	180	183	.....	.....	.....	.....	.....	.....	.....	.....

For the five years 1922 to 1926, however, the price of fish scrap was 140 per cent of pre-war prices.

Prices, and index numbers of prices, of dry ground fish are given in tables 40 and 41, respectively. Similar data for wet acidulated fish are given in the appendix.

Index numbers of prices of ammonia in organic ammoniates

A weighted index number of the price of ammonia in the organic ammoniates was made from the prices of cottonseed meal, tankage, and dry ground fish.[5] The weights used in making the index were: cottonseed meal, 280,000 tons; tankage, 11 per cent ammonia and 15 per cent bone phosphate, 790,000 tons; fish scrap, 260,000 tons. The weights were obtained from data in the 1914 and the 1919 Census of Manufactures.

During the seventeen-year period 1897 to 1913, there was a decided general upward trend in prices of organic ammoniates (figure 13). The index

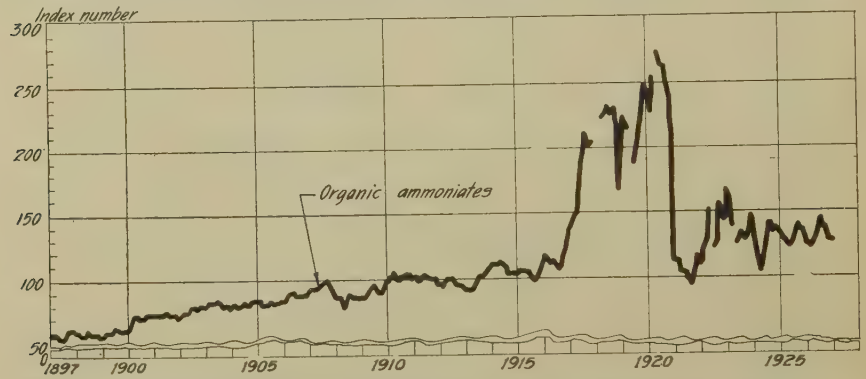

FIGURE 13. INDEX NUMBERS OF THE PRICE OF ORGANIC AMMONIATES, 1897 TO 1927

Organic ammoniates increased in price during the pre-war period, 1897 to 1913. Since 1922 they have averaged 133 per cent of the pre-war level

number rose from 59 in 1897 to 97 in 1913 (table 42). The average annual increase in the index was 2.6 points. During the same years the price of mineral ammoniates and potash remained relatively constant, while phosphoric acid declined. The rapid increase in the price of organic ammoniates was probably due to an increase in the demand for cottonseed meal, tankage, and fish scrap for feeding purposes.

Organic ammoniates reached a peak of 273 per cent of pre-war prices in May, 1920. They declined rapidly in price during the latter part of

[5] Prices for all the series were not available for the entire period from 1897 to 1928. The organic-ammoniate index is based on the prices of ammonia in tankage, cottonseed meal, and fish scrap. For the seven years 1897 to 1903, the prices of ammonia in tankage were not available. For the six years 1904 to 1909, the price of ammonia in tankage was 87.67 per cent of the price of ammonia in blood. The prices of ammonia in tankage used in making the organic-ammoniate index for the seven years 1897 to 1903 are 87.7 per cent of the price of ammonia in blood.

TABLE 42. INDEX NUMBERS OF PRICES OF ORGANIC AMMONIATES, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	58	58	57	57	57	57	59	60	62	62	63	61	59
1898	61	60	58	58	61	62	61	59	58	58	59	57	59
1899	58	59	58	59	60	65	64	62	62	62	61	61	61
1900	67	73	73	73	.....	70	70	72	73	74	75	.....	72
1901	.....	.....	.....	.....	.....	.....	76	74	72	74	73	72	.....
1902	75	74	74	76	80	80	80	78	78	81	81	80	78
1903	82	82	83	83	83	84	83	81	80	80	82	79	82
1904	81	82	81	79	79	81	83	80	81	83	85	85	82
1905	85	83	81	80	80	82	84	82	82	82	84	83	82
1906	86	87	89	87	90	90	90	87	87	87	89	90	88
1907	92	93	93	93	95	98	97	.....	91	90	88	85	92
1908	86	84	78	77	81	84	89	87	87	88	87	85	84
1909	86	86	86	88	90	93	95	91	90	90	94	97	90
1910	101	101	101	105	101	99	99	100	100	102	103	100	101
1911	101	102	98	96	96	102	103	101	100	100	99	96	100
1912	95	96	99	97	99	100	99	95	95	95	93	91	96
1913	91	90	90	91	93	95	100	101	101	99	102	110	97
1914	111	111	111	112	110	103	99	104	104	104	103	103	106
1915	104	105	105	105	104	.....	90	87	86	90	115	116	100
1916	117	113	111	109	110	111	106	108	113	118	131	138	115
1917	140	145	145	149	158	177	199	211	202	200	203	.....	177
1918	.....	.....	.....	.....	221	226	232	227	231	233	164	226	.....
1919	219	.....	.....	.....	.....	187	205	238	248	233	243	243	.....
1920	251	.....	.....	.....	273	266	266	250	234	214	156	115	232
1921	114	111	106	105	102	97	97	93	103	117	107	111	105
1922	122	128	152	.....	122	127	157	151	144	142	158	168	142
1923	139	.....	.....	.....	125	131	133	128	129	148	146	130	141
1924	.....	.....	116	111	104	108	121	140	144	136	138	135	124
1925	129	127	125	123	125	124	139	140	135	135	131	125	130
1926	124	123	.....	122	125	130	143	138	135	128	128	127	129
1927	130	.....	.....	.....	134	126	133	131	135	140	148	150	136
1928	153	153	154	155	161	.....	.....	.....	.....	.....	.....	.....	.....

1920, and reached a low point of 93 per cent of the pre-war level in August, 1921, a decline of 180 points in fifteen months.

During the five years 1922 to 1926, the price of organic ammoniates averaged 133 per cent of pre-war prices. During the same period, mineral ammoniates averaged 100 per cent of pre-war prices.

POTASH

German production

The important sources of potash are the deposits in Germany and in France.[6] There are also deposits of potash in Australia, China, India, Italy, Japan, Poland, Spain, and the United States.

The sales of potash (K_2O) from the German mines increased consistently from 1880 to 1913 (table 43 and figure 14). During the seventeen-year

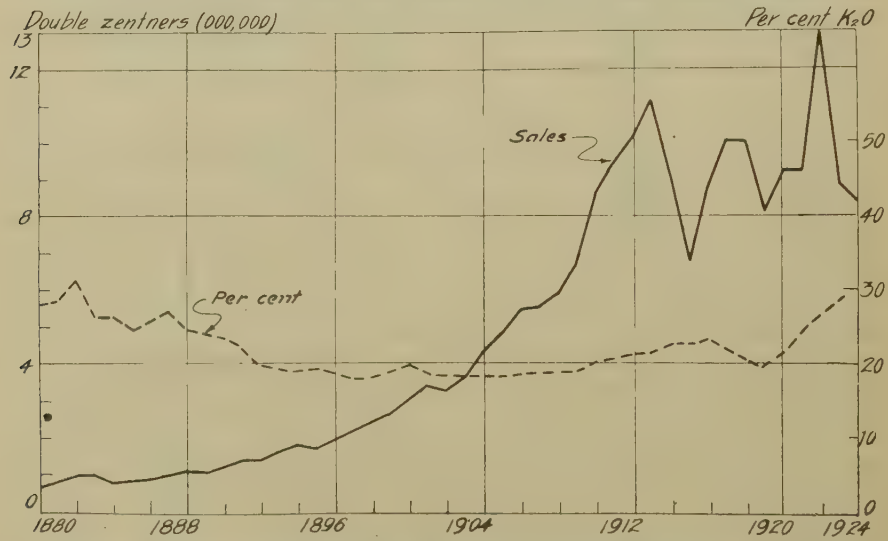

FIGURE 14. SALES OF PURE POTASH (K_2O) FROM GERMAN MINES, 1880 TO 1924, AND PERCENTAGE OF PURE POTASH (K_2O) IN THE POTASH SALTS SOLD

Sales of potash increased rapidly from 1880 to 1913. Since 1913 the fluctuations in sales have been wide

period 1880 to 1896, the average annual increase was 72,672 double zentners,[7] or 7994 short tons. During the following seventeen years, 1897 to 1913, the annual increase was 537,302 double zentners, or 59,103 short tons. The yearly percentage increases for the two periods were 6.1 per cent and 9.9 per cent, respectively. The annual increase in the tonnage of potash sold during the period from 1897 to 1913 was 7 times as great as the annual increase for the preceding seventeen years.

[6] The French deposits in Alsace were formerly operated and owned by German interests.
[7] A double zentner is equivalent to 220 pounds.

TABLE 43. CONSUMPTION OF PURE POTASH (K_2O) IN GERMANY AND IN OTHER COUNTRIES, 1878 TO 1924*

(Thousands of double zentners [a double zentner = 220 pounds])

Year	Germany			Other countries			Grand total
	In agriculture	In industry	Total	In agriculture	In industry	Total	
1878	34	308	342	143	149	292	634
1879	36	236	272	236	142	378	650
1880	42	243	285	249	152	401	686
1881	43	300	342	284	177	461	803
1882	67	308	375	340	278	618	993
1883	90	276	365	381	253	634	999
1884	88	253	341	281	181	462	803
1885	90	248	339	330	178	508	842
1886	113	305	417	265	166	431	849
1887	142	308	449	302	232	534	983
1888	172	292	463	415	232	648	1,111
1889	233	277	510	381	232	613	1,123
1890	267	263	530	448	245	693	1,223
1891	347	294	641	563	229	792	1,433
1892	514	243	757	480	178	658	1,415
1893	609	250	859	621	160	781	1,640
1894	652	291	944	652	196	848	1,792
1895	598	308	906	593	197	790	1,697
1896	751	337	1,088	687	198	885	1,973
1897	892	342	1,233	804	181	985	2,218
1898	960	359	1,318	895	227	1,122	2,441
1899	1,073	375	1,448	953	217	1,171	2,618
1900	1,172	458	1,630	1,156	250	1,406	3,036
1901	1,373	455	1,828	1,324	279	1,603	3,431
1902	1,373	363	1,735	1,292	262	1,554	3,289
1903	1,536	394	1,930	1,478	256	1,734	3,664
1904	1,879	426	2,306	1,707	288	1,996	4,301
1905	2,021	471	2,492	2,048	293	2,340	4,833
1906	2,285	487	2,772	2,416	287	2,703	5,475
1907	2,408	541	2,949	2,338	293	2,631	5,579
1908	2,730	553	3,283	2,363	270	2,634	5,916
1909	3,060	533	3,592	2,840	321	3,161	6,753
1910	3,593	594	4,187	4,069	323	4,391	8,579
1911	4,223	575	4,798	4,257	344	4,601	9,399
1912	4,634	652	5,286	4,404	403	4,807	10,092
1913	5,361	682	6,043	4,678	383	5,061	11,104
1914	4,836	542	5,378	3,405	257	3,662	9,040
1915	5,202	469	5,671	1,054	73	1,127	6,798
1916	6,806	445	7,250	1,514	75	1,589	8,840
1917	8,344	371	8,715	1,265	63	1,328	10,043
1918	8,217	380	8,597	1,367	53	1,419	10,017
1919	6,088	283	6,370	1,681	69	1,750	8,120
1920	6,464	441	6,905	2,246	85	2,331	9,236
1921	7,256	479	7,735	1,416	60	1,476	9,211
1922	8,898	776	9,674	3,175	106	3,281	12,955
1923	4,762	579	5,361	3,395	103	3,498	8,859
1924	.....	.....	.....	.....	.....	.....	8,421

* Data from *Kali Handbook*, 1925, pages 498–499, Commerce and Private Bank, Magdeburg, Germany

The sales of potash decreased with the beginning of the World War. For the twelve-year period 1913 to 1924, the fluctuations from year to year were much larger than formerly and there was no tendency for the tonnage to increase. The World War, the depreciation and revaluation of the German currency, and changes in the demand for potash, have tended to cause unusual fluctuations in potash sales.

During the seventeen years 1880 to 1896, there was a decline in the percentage of potash (K_2O) in the potash materials (salts) sold (figure 14). There was a tendency to use larger amounts of the lower-grade salts. During the following seventeen years, 1897 to 1913, however, there was a slight upward trend in the potash content of the salts. For the five years 1919 to 1923 this increase was especially marked, being from 19.5 per cent in 1919 to 28.4 per cent in 1923. More higher-grade salts were sold during that period.

For the three years 1922 to 1924, muriate, kainit, and 40-per-cent manure salts furnished 80 per cent of the total potash (K_2O) sold. Their relative importance was: manure salts, 40 per cent; muriate, 19 per cent; kainit, 21 per cent (figure 15). During the thirty-five years 1882 to 1916, muriate of potash declined in relative importance. In 1882, about 78 per cent of the potash (K_2O) sold was in the form of muriate. For the five pre-war years, 1909 to 1913, however, only 25 per cent of the potash was from muriate.

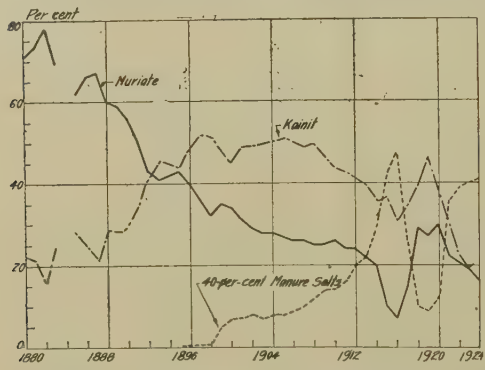

FIGURE 15. PERCENTAGE OF PURE POTASH (K_2O) FROM MURIATE, KAINIT, AND 40-PER-CENT MANURE SALTS, 1880 TO 1924

Muriate and kainit as a source of potash have been replaced to a considerable extent by 40-per-cent manure salts

Kainit, which is a low-grade salt (12.4 per cent K_2O), increased in relative importance during the nineteen years 1880 to 1898. During the following twenty-seven years, 1898 to 1924, the percentage of potash from kainit declined from about 50 per cent to 20 per cent. During this same period, 1898 to 1924, the percentage of potash from 40-per-cent manure salts increased from about 0.5 per cent to 40 per cent. Apparently, 40-per-cent manure salts have replaced to some extent kainit and muriate as a source of potash.

Potash is used for both agricultural and industrial purposes. Although the amount used in industry has increased, it has not increased so fast as has the amount used in agriculture. During the five years 1880 to 1884, approximately 57 per cent of the potash used was employed in industry

(table 44). At the present time, however, more than 90 per cent of it is used in agriculture. Sales of potash are more closely related to agricultural than to industrial demand.

TABLE 44. PERCENTAGE OF POTASH USED IN AGRICULTURE AND IN INDUSTRY, BY FIVE-YEAR PERIODS, 1880 TO 1923

Five-year period	Per cent of potash used	
	In agriculture	In industry
1880–1884	43.4	56.6
1885–1889	49.3	50.7
1890–1894	68.0	32.0
1895–1899	74.6	25.4
1900–1904	80.4	19.6
1905–1909	85.7	14.3
1910–1914	90.1	9.9
1915–1919	94.6	5.4
1920–1923*	93.4	6.6

* Four years.

For the thirty-two years 1880 to 1911, the general trends of consumption in Germany and in other countries were very similar (figure 16). After the outbreak of the war, however, the German consumption increased, while the consumption in other countries decreased.

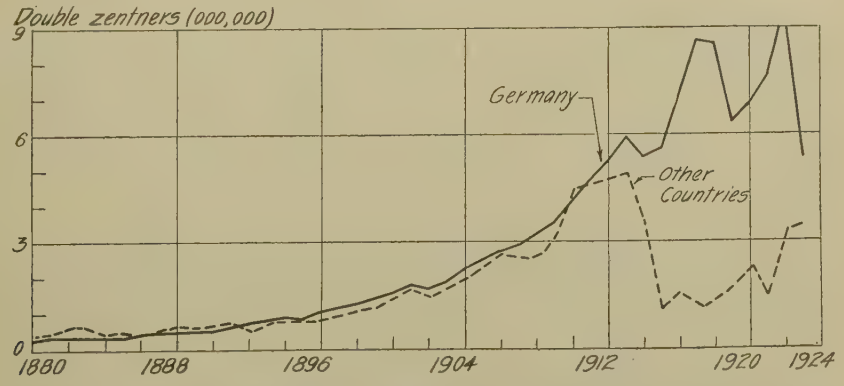

FIGURE 16. POTASH CONSUMPTION IN GERMANY AND IN OTHER COUNTRIES, IN DOUBLE ZENTNERS (220 POUNDS), 1880 TO 1923

From 1880 to 1913, consumption in Germany and in other countries increased at about the same rate. Since 1914, consumption in other countries has been low

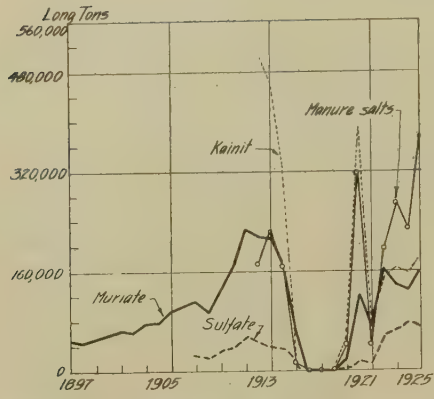

FIGURE 17. IMPORTS OF MURIATE OF POTASH, SULFATE, MANURE SALTS, AND KAINIT, IN LONG TONS, 1897 TO 1925

There were practically no imports during the war period. As compared with the pre-war period, imports of manure salts and sulfate have increased whereas those of muriate and kainit have declined

Imports into the United States

The imports of muriate of potash into the United States since 1897 are shown in figure 17. For the seventeen years 1897 to 1913, imports of muriate increased at the rate of 11,235 long tons per annum, an annual increase of 9.4 per cent. A comparison of the imports of the various salts just prior to the war with imports from 1922 to 1925, shows that muriate and kainit have declined, whereas manure salts and sulfate have increased.

There is a distinct seasonal variation in the imports of muriate (table 45). A comparison of the seasonal variation for the five years 1900 to 1904, and for the four years 1922 to 1925, shows some decided changes. During the early period, imports were lowest in February, increased gradually during the summer, and reached a decided peak in December

TABLE 45. INDEX NUMBERS OF SEASONAL VARIATION IN IMPORTS OF MURIATE OF POTASH

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1897–1913.....	118	75	86	68	73	72	91	87	96	110	144	179
1900–1904.....	94	24	41	51	62	58	85	84	84	126	230	259
1905–1909.....	101	34	44	50	73	88	101	104	117	143	169	176
1910–1914.....	152	123	138	102	78	79	102	75	82	65	82	122
1922–1925.....	106	110	123	95	44	94	157	105	84	93	77	112

(figure 18). For the latter period, imports were lowest in May and were high during the two months March and July. The larger imports during the summer months are due partly to special summer discounts. Orders received before May 15, for June and July delivery, were subject to 4 per cent discount on the quoted prices. The large orders for July delivery were probably due to the fact that this was the last month to which the full discount of 4 per cent applied.

Seasonal variation in prices of potash salts

Although there is a distinct seasonal variation in the imports of muriate of potash, there is no seasonal variation in the quoted prices of potash (table 46). Published prices are uniform throughout the year. For the past few years, however, special summer discounts have been given. This discount is not reflected in the published quoted prices, and consequently potash could be purchased at less than list prices during these months.

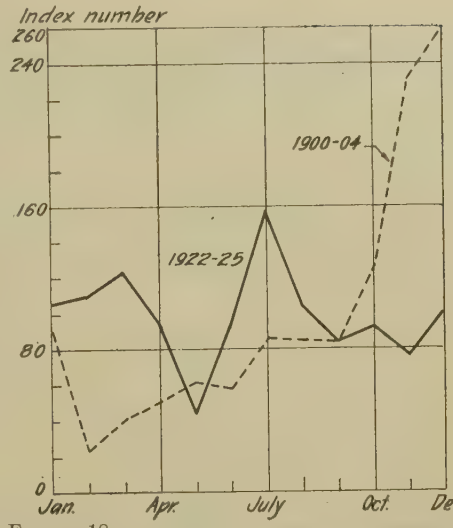

FIGURE 18. SEASONAL VARIATION IN IMPORTS OF MURIATE OF POTASH, 1900 TO 1904 AND 1922 TO 1925

During the period from 1900 to 1904, imports were largest in November and December. During the later period, 1922 to 1925, they were largest in March and July

Prices of potash in the United States

For the thirty-six months July, 1911, to June, 1914, the average

TABLE 46. INDEX NUMBERS OF SEASONAL VARIATION IN PRICES OF POTASH SALTS

Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Muriate of potash												
1897–1913	100	100	99	100	100	100	100	100	100	100	100	100
1900–1904	99	99	100	100	100	100	100	100	100	100	100	100
1905–1909	100	100	100	100	100	100	100	100	100	100	100	100
1910–1914	100	100	98	98	99	99	101	101	101	101	101	101
1922–1926	102	102	101	101	100	99	99	99	99	99	99	100
Sulfate of potash												
1897–1913	100	99	99	100	100	100	100	100	100	100	100	100
1900–1904	99	99	100	100	100	100	100	100	100	100	100	100
1905–1909	100	100	100	100	100	100	100	100	100	100	100	100
1910–1914	100	99	98	98	98	99	101	101	102	102	101	101
1922–1926	102	102	101	101	99	98	99	99	99	99	99	100
Sulfate of potash magnesia												
1897–1913	100	99	99	99	100	100	100	100	101	101	101	100
1900–1904	98	98	101	101	101	100	100	100	100	100	100	100
1905–1909	100	100	100	100	100	100	100	100	100	100	100	100
1910–1914	100	99	98	98	98	99	101	101	102	102	102	101
1923–1926	100	100	100	100	100	100	100	100	100	100	100	101
Manure salts												
1905–1909	100	100	100	100	100	100	100	100	100	100	100	100
1910–1914	100	99	98	98	99	99	101	101	101	101	101	101
1922–1926	100	100	100	101	100	99	100	100	100	100	100	100
Kainit												
1905–1909	102	101	99	99	99	99	99	99	100	100	100	100
1910–1914	99	98	98	98	98	99	101	101	102	102	102	102
1922–1926	100	100	100	100	99	98	99	99	100	100	101	102

yearly imports of potash salts were: muriate of potash, 215,000 tons; sulfate of potash, 41,000 tons; manure salts, 209,000 tons; kainit, 405,000 tons. Index numbers of the prices of potash were computed using these weights[8] (table 47 and figure 19). The prices and the index numbers of the prices of the individual potash salts are given in tables 48 to 57 inclusive.

For the seventeen-year period 1897 to 1913, the price of potash salts remained relatively constant. The lowest prices for this period were in

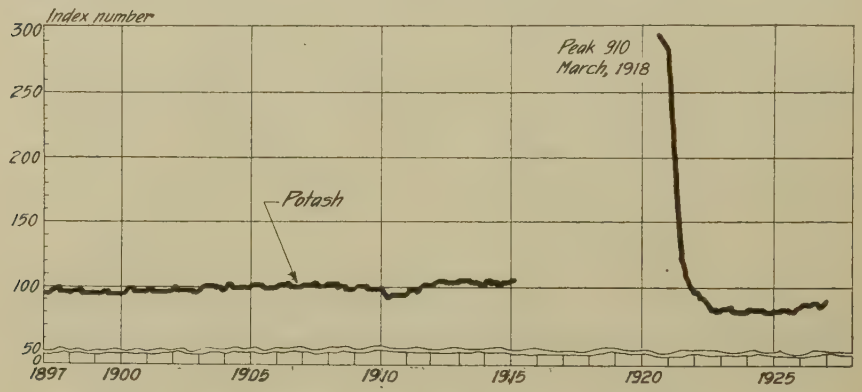

FIGURE 19. INDEX NUMBERS OF WHOLESALE PRICES OF POTASH, 1897 TO 1927

Potash prices were relatively stable from 1897 to 1913. Since the war they have been low, being only 86 per cent of the pre-war level

1910, when the index number was 93, and the highest were in 1913, when the index number was 103.

There were practically no importations into the United States during and immediately following the World War. Prices were extremely high. In 1918 the index number of the prices of potash was 822 (table 47). The index numbers of the prices of muriate of potash for the two years 1916 and 1917 were 1057 and 1035, respectively (table 49).

Importations were resumed during the latter part of 1919 and 1920, just before deflation took place, and prices declined rapidly. For the five years 1922 to 1926, prices averaged only 83 per cent of the pre-war level. During the same period, the index number of wholesale prices as computed by the United States Bureau of Labor Statistics averaged about 155 per cent and farm prices 139 per cent of pre-war averages. In this period, very few commodities sold for less than their pre-war average price.

[8] Prices were not available for all the series for the entire period from 1897 to 1928. The potash index for the four years 1897 to 1900 is based on the prices of muriate and sulfate of potash; for the three years 1901 to 1903, the index is based on the prices of muriate, sulfate, and manure salts.

TABLE 47. INDEX NUMBERS OF PRICES OF POTASH, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	94	95	96	97	97	97	95	95	95	95	95	95	95
1898	95	96	97	97	97	97	95	95	95	95	95	95	96
1899	95	95	95	96	96	95	94	94	93	94	94	94	94
1900	94	95	98	98	98	97	96	96	96	96	96	96	96
1901	96	97	99	99	98	98	96	96	96	96	96	96	97
1902	97	98	99	99	98	98	95	96	95	95	96	96	97
1903	96	97	100	101	100	100	98	98	98	98	98	97	98
1904	99	100	102	102	101	101	99	99	99	99	99	99	100
1905	100	100	102	102	102	101	100	100	99	99	99	100	100
1906	101	101	102	102	102	101	100	100	99	99	99	100	100
1907	101	101	102	102	102	101	100	100	100	101	101	101	101
1908	102	102	99	100	100	99	98	97	97	97	97	97	99
1909	98	99	100	100	100	99	98	98	97	97	97	97	98
1910	98	95	91	91	91	93	93	93	93	93	93	93	93
1911	94	95	96	96	95	95	100	100	102	101	101	100	98
1912	101	102	103	103	104	104	102	102	101	102	102	102	102
1913	103	104	105	105	104	104	102	101	101	101	101	101	103
1914	104	104	105	105	105	104	103	103	103	103	104	104	104
1915	105	.....	.....	.....	.....	.....	565	579	569	569	789	952	540
1916	924	895	841	828	773	689	659	677	692	823	847	848	791
1917	831	839	849	823	813	773	737	951	902	852	860	896	775
1918	896	901	910	908	905	834	789	747	745	749	747	744	822
1919	727	726	683	692	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	.....	394	377	357	349	330	325	333	305	292	288	270	333
1921	228	205	185	154	140	126	122	116	112	102	94	93	133
1922	94	94	93	93	87	83	84	84	84	83	81	81	87
1923	82	83	84	84	82	81	80	80	80	80	80	80	81
1924	81	82	83	82	82	82	80	80	80	81	81	81	81
1925	82	82	83	83	83	83	81	81	81	83	84	84	83
1926	85	85	86	86	87	87	85	85	85	85	88	89	86
1927	90	91	92	92	92	93	93	94	94	95	96	97	93
1928	100	101	102	102	94	.....	.....	.....	.....	.....	.....	.....	.....

MURIATE OF POTASH, 80 TO 85 PER CENT, IN BAGS, TO GROUP BUYERS IN NEW YORK CITY, 1897 TO 1928†

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897–1913	$ 37.57	$ 37.45	$ 37.33	$ 37.41	$ 37.48	$ 37.54	$ 37.70	$ 37.67	$ 37.70	$ 37.69	$ 37.67	$ 37.65	$ 37.57
1909–1913	37.67	37.27	37.87	36.89	36.97	37.20	37.78	37.68	37.78	37.74	37.68	37.68	37.43
1910–1914	37.88	37.48	37.08	37.10	37.18	37.42	37.99	37.95	38.09	38.05	37.99	37.99	37.69
1897	36.25	26.25	26.25	26.39	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.63
1898	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.80	36.80
1899	36.80	36.20	36.60	36.05	36.20	36.20	36.20	36.20	36.20	36.20	36.20	36.20	36.19
1900	36.20	36.28	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.83
1901	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95	36.95
1902	36.95	36.95	36.95	36.95	36.95	36.83	36.65	36.65	36.65	36.65	36.65	36.65	36.79
1903	36.65	36.65	37.51	37.80	37.80	37.80	37.80	37.80	37.80	37.80	37.80	37.41	37.55
1904	37.95	37.95	37.95	37.95	37.95	37.95	37.95	37.95	37.95	37.95	37.95	37.95	37.95
1905	37.95	38.32	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.11
1906	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30
1907	39.30	39.30	38.98	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.27
1908	39.30	39.30	37.70	37.85	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38'00	38.18
1909	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
1910	38.00	36.00	34.00	34.00	34.00	35.16	35.75	35.75	35.75	35.75	35.75	35.75	35.47
1911	35.75	35.75	35.75	35.75	35.75	35.75	38.05	38.05	38.55	38.35	38.05	38.05	36.97
1912	38.05	38.05	38.05	38.15	38.55	38.55	38.55	38.55	38.55	38.55	38.55	38.55	38.39
1913	38.55	38.55	38.55	38.55	38.55	38.55	38.55	38.05	38.05	38.05	38.05	38.05	38.34
1914	39.07	39.07	39.07	39.07	39.07	39.07	39.07	39.37	39.57	39.57	39.57	39.57	39.26
1915	39.57	.....	.....	153.75	149.00	199.75	247.50	253.50	247.50	247.50	390.50	503.12	243.17
1916	483.50	464.38	421.88	412.50	372.00	320.00	306.00	320.00	333.75	437.00	455.00	455.00	398.42
1917	435.00	435.62	437.50	418.50	412.50	384.38	367.00	390.00	363.13	342.00	345.00	350.00	390.05
1918	348.13	347.50	347.50	344.50	340.00	310.00	305.00	285.00	285.00	286.88	285.00	285.00	314.13
1919	282.50	280.00	263.00	267.50	.....	.....	102.50	120.00	114.00	110.00	62.50	141.75	174.38
1920	143.75	145.00	134.25	126.25	125.00	120.00	120.00	121.50	116.25	110.94	108.75	100.30	122.67
1921	84.50	75.00	69.06	55.62	51.75	48.12	46.25	44.25	42.50	39.50	37.19	36.25	52.50
1922	36.25	35.94	35.00	35.00	33.20	32.00	32.95	32.95	32.95	32.95	32.00	32.00	33.60
1923	32.00	32.00	32.00	32.00	31.32	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.42
1924	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10
1925	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.10	31.19
1926	31.41	31.41	31.41	31.41	31.41	31.41	31.41	31.41	31.41	31.41	31.41	31.41	31.60
1927	32.76	32.76	32.76	32.76	32.76	33.49	33.85	34.22	34.58	34.94	35.31	35.67	33.82
1928	36.40	36.40	36.40	36.40	33.49	.....	.....	.....	.....	.....	.....	.....	.....

* In lots of 500 tons or over.

† Prices of muriate of potash were obtained from the *Oil, Paint and Drug Reporter*. From 1897 to February, 1910, the quoted hundredweight prices were multiplied by 20. From November, 1919, to May, 1922, the quoted unit prices were multiplied by 50. From November, 1922, to June, 1923, and from September, 1924, to May, 1927, the 10-per-cent quantity discount was subtracted. From June, 1927, to May, 1928, the time discounts were deducted.

TABLE 49. INDEX NUMBERS OF PRICES OF MURIATE OF POTASH, 80 TO 85 PER CENT, IN BAGS, TO GROUP BUYERS IN NEW YORK CITY, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	96	97	98	98	99	98	97	97	97	97	97	97	97
1898	97	98	99	99	99	98	97	97	97	97	97	97	98
1899	97	97	96	97	97	97	95	95	95	95	95	95	96
1900	96	97	100	100	99	99	97	97	97	97	97	97	98
1901	98	99	100	100	99	99	97	97	97	97	97	97	98
1902	98	99	100	100	99	98	96	97	96	96	96	96	98
1903	97	98	101	102	102	101	99	100	99	99	99	98	100
1904	100	101	102	102	102	101	100	100	100	100	100	100	101
1905	100	102	106	106	106	105	103	104	103	103	103	103	104
1906	104	105	106	106	106	105	103	104	103	103	103	103	104
1907	104	105	105	106	106	105	103	104	103	103	103	103	104
1908	104	105	102	102	102	102	100	100	100	100	100	100	101
1909	100	101	102	102	102	102	100	100	100	100	100	100	101
1910	100	96	92	92	91	94	94	94	94	94	94	94	94
1911	94	95	96	96	96	96	100	100	101	101	100	100	98
1912	100	102	103	103	104	103	101	102	101	101	101	101	102
1913	102	103	104	104	104	103	101	100	100	100	100	100	102
1914	103	104	105	105	105	104	103	104	104	104	104	104	104
1915	104	.....	.....	414	401	534	651	668	650	650	1,028	1,324	645
1916	1,276	1,239	1,138	1,112	1,001	855	805	843	876	1,148	1,198	1,198	1,057
1917	1,148	1,162	1,180	1,128	1,109	1,027	966	1,028	953	899	908	921	1 035
1918	919	927	937	929	914	828	803	751	748	754	750	750	833
1919	746	747	709	721	.....	.....	270	316	299	289	165	373	463
1920	379	387	362	340	336	321	316	320	305	292	286	264	325
1921	223	200	186	150	139	129	122	117	112	104	98	95	139
1922	96	96	94	94	89	86	87	87	87	87	84	84	89
1923	84	85	86	86	84	83	82	82	82	82	82	82	83
1924	82	83	84	84	84	83	82	82	82	82	82	82	83
1925	82	83	84	84	84	83	82	82	82	83	83	83	83
1926	83	84	85	85	84	84	83	83	82	83	85	86	84
1927	86	87	88	88	88	89	89	90	91	92	93	94	90
1928	96	97	98	98	90	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 50. PRICES OF SULFATE OF POTASH, 90 TO 95 PER CENT, IN BAGS, TO GROUP BUYERS IN NEW YORK CITY, 1897 TO 1928*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$ 45.57	$ 45.20	$ 44.83	$ 44.85	$ 44.93	$ 45.31	$ 46.23	$ 46.29	$ 46.43	$ 46.43	$ 46.36	$ 46.29	$ 45.73
1897	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25
1898	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25	40.25
1899	40.25	39.98	39.70	40.00	40.10	40.10	40.10	40.10	40.10	40.10	40.10	40.10	40.06
1900	40.10	40.45	41.40	41.40	41.40	41.40	41.40	41.40	41.40	41.40	41.40	41.40	41.21
1901	41.40	41.40	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.32
1902	42.50	42.50	42.50	42.50	42.50	42.38	42.20	42.20	42.20	42.20	42.20	42.20	42.34
1903	42.20	42.20	42.72	42.90	42.90	42.90	42.90	42.90	42.90	42.90	42.90	42.75	42.76
1904	42.50	41.92	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.50	42.45
1905	42.50	42.95	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	43.79
1906	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00
1907	44.00	44.00	43.78	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.05	44.02
1908	44.05	43.89	43.40	43.50	43.60	43.60	43.60	43.60	43.60	43.60	43.60	43.60	43.64
1909	43.60	43.60	43.60	43.60	43.62	43.70	43.70	43.70	43.70	43.70	43.70	43.70	43.66
1910	43.70	41.85	40.00	40.00	40.00	41.88	43.50	43.50	43.50	43.50	43.50	43.50	42.37
1911	43.50	43.50	43.50	43.50	43.50	43.50	46.50	46.50	47.00	47.00	46.65	46.30	45.08
1912	46.30	46.30	46.30	46.40	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.64
1913	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.80	46.80
1914	47.57	47.57	47.57	47.57	47.57	47.57	47.57	47.87	48.07	48.07	48.07	48.07	47.76
1915	48.07	.....	.....	140.00	140.00	181.25	205.00	207.50	207.50	207.50	360.50	440.00	213.73
1916	386.00	346.88	337.50	337.50	337.50	287.50	287.50	287.50	287.50	287.50	287.50	287.50	313.16
1917	287.50	287.50	287.50	287.50	287.50	287.50	287.50	287.50	312.50	300.00	300.00	363.12	297.97
1918	363.12	355.00	355.00	368.00	387.50	387.50	337.50	337.50	337.50	337.50	337.50	330.00	352.80
1919	293.75	287.50	255.00	225.00	.....	.....	.....	.....	.....	.....	.....	.....	265.31
1920	.....	192.00	192.00	192.00	182.40	168.00	168.00	180.00	141.60	136.80	136.80	136.80	166.04
1921	112.80	103.20	99.60	85.80	72.00	66.00	64.80	60.24	58.80	52.02	47.26	47.02	72.46
1922	47.50	47.50	45.25	45.25	42.66	41.10	42.35	42.35	42.35	42.35	41.10	41.10	43.40
1923	41.10	41.10	41.10	41.10	39.75	39.30	39.30	39.30	39.30	39.30	39.79	41.26	40.14
1924	41.26	41.26	41.26	41.26	41.26	41.27	41.27	41.27	41.27	41.26	41.26	41.26	41.26
1925	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26
1926	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	41.26	42.17	42.57	41.44
1927	42.57	42.57	42.57	42.57	42.57	43.52	43.99	44.46	44.94	45.41	45.88	46.35	43.95
1928	47.30	47.30	47.30	47.30	43.52	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of sulfate of potash were obtained from the *Oil, Paint and Drug Reporter*. From 1897 to February, 1910, the quoted hundredweight prices were multiplied by 20. From February, 1920, to November, 1921, the quoted unit prices were multiplied by 48. From November, 1922, to June, 1923, and from September, 1924, to May, 1927, the 10-per-cent quantity discount was subtracted. From June, 1927, to May, 1928, the time discounts were deducted.

TABLE 51. INDEX NUMBERS OF PRICES OF SULFATE OF POTASH, 90 TO 95 PER CENT, IN BAGS, TO GROUP BUYERS IN NEW YORK CITY, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	88	89	90	90	90	89	87	87	87	87	87	87	88
1898	88	89	90	90	90	89	87	87	87	87	87	87	88
1899	88	88	89	89	89	89	87	87	86	86	86	87	88
1900	88	89	92	92	92	91	90	90	89	89	89	89	90
1901	91	92	95	95	95	94	92	92	92	92	92	92	93
1902	93	94	95	95	95	94	91	91	91	91	91	91	93
1903	93	93	95	96	95	95	93	93	92	92	93	92	94
1904	93	93	95	95	95	94	92	92	92	92	92	92	93
1905	93	95	98	98	98	97	95	95	95	95	95	95	96
1906	97	97	98	98	98	97	95	95	95	95	95	95	96
1907	97	97	98	98	98	97	95	95	95	95	95	95	96
1908	97	97	97	97	97	96	94	94	94	94	94	94	95
1909	96	96	97	97	97	96	95	94	94	94	94	94	95
1910	96	93	89	89	89	92	94	94	94	94	94	94	93
1911	95	96	97	97	97	96	101	100	101	101	101	100	99
1912	102	102	103	103	104	103	101	101	101	101	101	101	102
1913	103	104	104	104	104	103	101	101	101	101	101	101	102
1914	104	105	106	106	106	105	103	103	104	104	104	104	104
1915	105	.....	.....	312	312	400	443	448	447	447	778	951	467
1916	847	767	753	753	751	635	622	621	619	619	620	621	685
1917	631	636	641	641	640	635	622	621	673	646	647	784	652
1918	797	785	792	821	862	855	730	729	727	727	728	713	771
1919	645	636	569	502	.....	.....	.....	.....	.....	.....	.....	.....	580
1920	.....	425	428	428	406	371	363	389	305	295	295	296	363
1921	248	228	222	191	160	146	140	130	127	112	102	102	158
1922	104	105	101	101	95	91	92	91	91	91	89	89	95
1923	90	91	92	92	88	87	85	85	85	85	86	89	88
1924	91	91	92	92	92	91	89	89	89	89	89	89	90
1925	91	91	92	92	92	91	89	89	89	89	89	89	90
1926	91	91	92	92	92	91	89	89	89	89	91	92	91
1927	93	94	95	95	95	96	95	96	97	98	99	100	96
1928	104	105	106	105	97	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 52. PRICES OF SULFATE OF POTASH MAGNESIA, IN BAGS, TO GROUP BUYERS IN NEW YORK CITY, 1897 TO 1928*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$ 24.10	$ 23.87	$ 23.64	$ 23.66	$ 23.74	$ 23.91	$ 24.43	$ 24.49	$ 24.63	$ 24.63	$ 24.58	$ 24.53	$ 24.18
1897	20.85	20.85	20.85	21.09	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.50
1898	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80	21.80
1899	21.80	21.10	20.40	20.66	20.75	20.75	20.75	20.75	20.75	20.75	20.75	20.75	20.83
1900	20.75	20.90	21.45	21.45	21.45	21.45	21.45	21.45	21.45	21.45	21.45	21.45	21.35
1901	21.45	21.45	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.41
1902	22.60	22.60	22.60	22.60	22.60	22.38	22.05	22.05	22.05	22.05	22.05	22.05	22.31
1903	22.05	22.05	22.54	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.70	22.58
1904	22.70	22.18	22.70	22.70	22.70	22.70	22.66	22.65	22.65	22.65	22.65	22.65	22.63
1905	22.65	22.82	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.46
1906	23.60	23.60	23.45	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.59
1907	23.60	23.60	23.38	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.51
1908	23.50	23.38	23.00	23.15	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.29
1909	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
1910	23.30	22.15	21.00	21.00	21.00	21.88	22.75	22.75	22.75	22.75	22.75	22.75	22.24
1911	22.75	22.75	22.75	22.75	22.75	22.75	24.45	24.45	24.95	24.95	24.70	24.45	23.70
1912	24.45	24.45	24.45	24.55	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.79
1913	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.95	24.95
1914	25.04	25.04	25.04	25.04	25.04	25.04	25.04	25.34	25.54	25.54	25.54	25.54	25.23
1915	25.54	.....	.....	57.00	57.00	57.00	81.00	105.00	105.00	105.00	105.00	105.00	80.20
1916	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00
1917	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00	.....	.....	.....	.....	105.00
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1922	.....	.....	.....	.....	.....	23.50	24.15	24.15	24.15	24.15	23.50	23.50	23.87
1923	23.50	23.50	23.50	23.50	23.24	23.15	23.15	23.15	23.15	23.15	23.15	23.72	23.32
1924	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72
1925	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72
1926	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	23.72	24.30	24.53	23.84
1927	24.53	24.53	24.53	24.53	24.53	25.07	25.34	25.62	25.89	26.16	26.43	26.71	25.32
1928	27.25	27.25	27.25	27.25	25.07	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of sulfate of potash magnesia were obtained from the *Oil, Paint and Drug Reporter*. From 1897 to February, 1910, the quoted hundredweight prices were multiplied by 20. From June, 1922, to March, 1923, the quotations were for bulk, and $1.25 per ton was added to get comparable quotations per ton in bags. From November, 1922, to June, 1923, and from September, 1924, to May, 1927, the 10-per-cent quantity discount was subtracted. From June, 1927, to May, 1928, the time discounts were deducted.

TABLE 53. INDEX NUMBERS OF PRICES OF SULFATE OF POTASH MAGNESIA, IN BAGS, TO GROUP BUYERS IN NEW YORK CITY, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	87	87	88	89	92	91	89	89	89	89	89	89	89
1898	90	91	92	92	92	91	89	89	89	89	89	89	90
1899	90	88	86	87	87	87	85	85	84	84	84	85	86
1900	86	88	91	91	90	90	88	88	87	87	87	87	88
1901	89	90	96	96	95	95	93	92	92	92	92	92	93
1902	94	95	96	96	95	94	90	90	90	90	90	90	92
1903	91	92	95	96	96	95	93	93	92	92	92	93	93
1904	94	93	96	96	96	95	93	92	92	92	92	92	94
1905	94	96	100	100	99	99	97	96	96	96	96	96	97
1906	98	99	99	100	99	99	97	96	96	96	96	96	98
1907	98	99	99	99	99	98	96	96	95	95	96	96	97
1908	98	98	97	98	98	97	95	95	95	95	95	95	96
1909	97	98	99	98	98	97	95	95	95	95	95	95	96
1910	97	93	89	89	88	92	93	93	92	92	93	93	92
1911	94	95	96	96	96	95	100	100	101	101	100	100	98
1912	101	102	103	104	105	104	102	102	101	101	102	102	103
1913	104	105	106	105	105	104	102	102	101	101	102	102	103
1914	104	105	106	106	105	105	102	103	104	104	104	104	104
1915	106	.....	.....	241	240	238	332	429	426	426	427	428	332
1916	436	440	444	444	442	439	430	429	426	426	427	428	434
1917	436	440	444	444	442	439	430	429	.....	.....	.....	.....	434
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1922	.....	.....	.....	.....	.....	98	99	99	98	98	96	96	99
1923	98	98	99	99	98	97	95	95	94	94	94	97	96
1924	98	99	100	100	100	99	97	97	96	96	97	97	98
1925	98	99	100	100	100	99	97	97	96	96	97	97	98
1926	98	99	100	100	100	99	97	97	96	96	99	100	99
1927	102	103	104	104	103	105	104	105	105	106	108	109	105
1928	113	114	115	115	106	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 54. PRICES OF MANURE SALTS, 20 PER CENT, IN BULK, TO GROUP BUYERS IN NEW YORK CITY, 1904 TO 1928*
(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$13.16	$13.04	$12.93	$12.93	$12.97	$12.99	$13.23	$13.25	$13.31	$13.31	$13.29	$13.27	$13.14
1904	.....	12.70	13.10	13.10	13.10	13.10	13.15	13.10	13.10	13.10	13.10	13.10	13.07
1905	13.10	13.02	13.42	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.39
1906	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46
1907	13.46	13.46	13.42	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46	13.46
1908	13.46	13.37	13.10	13.14	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.20
1909	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
1910	13.17	12.58	12.00	12.00	12.00	12.12	12.25	12.25	12.25	12.25	12.25	12.25	12.28
1911	12.25	12.25	12.25	12.25	12.25	12.25	13.30	13.30	13.50	13.50	13.40	13.30	12.82
1912	13.30	13.30	13.30	13.34	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.44
1913	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50
1914	13.58	13.58	13.58	13.58	13.58	13.58	13.58	13.70	13.78	13.78	13.78	13.78	13.66
1915	13.78	.....	.....	30.50	32.00	36.50	55.00	60.00	60.00	60.00	60.00	60.00	46.78
1916	60.00	58.75	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.73
1917	55.00	55.00	55.00	55.00	55.00	55.00	55.00	55.00	.....	.....	.....	.....	55.00
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921	.....	.....	22.24	19.37	17.10	15.37	15.50	14.70	14.50	12.50	11.00	11.00	15.33
1922	11.00	11.00	11.00	11.00	10.10	9.50	9.80	9.80	9.80	9.80	9.50	9.50	10.15
1923	9.50	9.50	9.50	9.50	9.50	9.50	9.46	9.44	9.44	9.44	9.44	9.44	9.47
1924	9.44	9.46	9.50	9.50	9.50	9.50	9.50	9.50	9.38	9.30	9.30	9.30	9.43
1925	9.30	9.30	9.30	9.40	9.70	9.70	9.70	9.70	9.86	10.02	10.02	10.02	9.67
1926	10.22	10.22	10.22	10.32	10.67	10.67	10.67	10.67	10.67	10.67	11.07	11.16	10.60
1927	11.16	11.16	11.16	11.16	11.16	11.41	11.53	11.66	11.78	11.90	12.03	12.15	11.52
1928	12.40	12.40	12.40	12.40	11.41	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of manure salts were obtained from the *Oil, Paint and Drug Reporter*. From 1904 to February, 1905, the quoted unit prices wer multiplied by 20. From March, 1905, to February, 1910, the quoted long-ton prices were multiplied by 0.893 to convert them to short tons. From March, 1921, to May, 1922, the quoted unit prices were multiplied by 20. From November, 1922, to June, 1923, and from September 1924, to May, 1927, the 10-per-cent quantity discount was subtracted. From June, 1927, to May, 1928, the time discounts were deducted.

TABLE 55. INDEX NUMBERS OF PRICES OF MANURE SALTS, 20 PER CENT, IN BULK, TO GROUP BUYERS IN NEW YORK CITY, 1904 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1904	.....	97	101	101	101	101	99	99	98	98	99	99	99
1905	100	100	104	104	104	104	102	102	101	101	101	101	102
1906	102	103	104	104	104	104	102	102	101	101	101	101	102
1907	102	103	104	104	104	104	102	102	101	101	101	101	102
1908	102	103	101	102	102	101	100	99	99	99	99	99	100
1909	100	101	102	102	102	101	100	99	99	99	99	99	100
1910	100	96	93	93	93	93	93	92	92	92	92	92	93
1911	93	94	95	95	94	94	101	100	101	101	101	100	98
1912	101	102	103	103	104	104	102	102	101	101	102	102	102
1913	103	104	104	104	104	104	102	102	101	101	102	102	103
1914	103	104	105	105	105	105	103	103	104	104	104	104	104
1915	105	.....	.....	236	247	281	416	453	451	451	451	452	356
1916	456	451	425	425	424	423	416	415	413	413	414	414	424
1917	418	422	425	425	424	423	416	415	.....	.....	.....	.....	419
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921	.....	.....	172	150	132	118	117	111	109	94	83	83	117
1922	84	84	85	85	78	73	74	74	74	74	71	72	77
1923	72	73	73	73	73	73	72	71	71	71	71	71	72
1924	72	73	73	73	73	73	72	72	70	70	70	70	72
1925	71	71	72	73	75	75	73	73	74	75	75	76	74
1926	78	78	79	80	82	82	81	81	80	80	83	84	81
1927	85	86	86	86	86	88	87	88	89	89	91	92	88
1928	94	95	96	96	88	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 56. PRICES OF KAINIT, 12.4 PER CENT, IN BULK, TO GROUP BUYERS IN NEW YORK CITY, 1904 TO 1928*

(Dollars per short ton)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914.....	$ 8.03	$ 8.00	$ 7.96	$ 7.97	$ 8.00	$ 8.03	$ 8.20	$ 8.23	$ 8.28	$ 8.28	$ 8.26	$ 8.24	$ 8.12
1904.....	8.30	8.13	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.29
1905.....	8.30	7.83	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.67
1906.....	7.59	7.59	7.53	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.58
1907.....	7.59	7.59	7.53	7.59	7.59	7.59	7.59	7.59	7.95	8.04	8.04	8.04	7.73
1908.....	8.04	7.90	7.48	7.53	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.64
1909.....	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59
1910.....	7.59	7.42	7.25	7.25	7.25	7.38	7.50	7.50	7.50	7.50	7.50	7.50	7.43
1911.....	7.50	7.50	7.50	7.50	7.50	7.50	8.25	8.25	8.45	8.45	8.35	8.25	7.92
1912.....	8.25	8.25	8.25	8.29	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.39
1913.....	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45
1914.....	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.48	8.56	8.56	8.56	8.56	8.44
1915.....	8.56	.....	.....	.....	.....	.....	45.00	45.00	45.00	45.00	45.00	45.00	39.79
1916.....	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
1917.....	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	.....	.....	.....	.....	45.00
1918.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921.....	.....	.....	13.79	11.71	10.60	9.54	9.61	9.11	8.99	8.06	7.44	7.44	9.63
1922.....	7.44	7.44	7.44	7.44	6.88	6.50	6.70	6.70	6.70	6.63	6.50	6.50	6.91
1923.....	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1924.....	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.66	6.78	6.78	6.78	6.58
1925.....	6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.89	7.00	7.00	7.00	6.84
1926.....	7.20	7.20	7.20	7.25	7.43	7.43	7.43	7.43	7.43	7.43	8.01	8.10	7.46
1927.....	8.10	8.10	8.10	8.10	8.10	8.28	8.37	8.46	8.55	8.64	8.73	8.82	8.36
1928.....	9.00	9.00	9.00	9.00	8.28	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of kainit were obtained from the *Oil, Paint and Drug Reporter*. From 1904 to February, 1910, the quoted long-ton prices were multiplied by 0.893 to convert them to short tons. From March, 1921, to May, 1922, the quoted unit prices were multiplied by 12.4. From November, 1922, to June, 1923, and from September, 1924, to May, 1927, the 10-per-cent quantity discount was subtracted. From June, 1927, to May, 1928, the time discounts were deducted. From September, 1924, to December, 1925, $2 was subtracted from the bagged-ton price to get comparable bulk prices.

TABLE 57. INDEX NUMBERS OF PRICES OF KAINIT, 12.4 PER CENT, IN BULK, TO GROUP BUYERS IN NEW YORK CITY, 1904 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1904	103	102	104	104	104	103	101	101	100	100	100	101	102
1905	103	98	95	95	95	95	93	92	92	92	92	92	94
1906	95	95	95	95	95	95	93	92	92	92	92	92	93
1907	95	95	95	95	95	95	93	92	96	97	97	98	95
1908	100	99	94	94	95	95	93	92	92	92	92	92	94
1909	95	95	95	95	95	95	93	92	92	92	92	92	93
1910	95	93	91	91	91	90	91	91	91	91	91	91	91
1911	93	94	94	94	94	93	101	100	102	102	101	100	97
1912	103	103	104	104	106	105	103	103	102	102	102	103	103
1913	105	106	106	106	106	105	103	103	102	102	102	103	104
1914	104	105	105	105	104	104	102	103	103	103	104	104	104
1915	107	.....	.....	.....	.....	.....	549	547	543	543	545	546	490
1916	560	563	565	565	562	561	549	547	543	543	545	546	554
1917	560	563	565	565	562	561	549	547	.....	.....	.....	.....	554
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1921	.....	.....	173	147	133	119	117	111	109	97	90	90	119
1922	93	93	93	93	86	81	82	81	81	80	79	79	85
1923	81	81	82	82	81	81	79	79	78	78	79	79	80
1924	81	81	82	82	81	81	79	79	80	82	82	82	81
1925	84	85	85	85	85	84	83	82	83	85	85	85	84
1926	90	90	90	91	93	93	91	90	90	90	97	98	92
1927	101	101	102	102	101	103	102	103	103	104	106	107	103
1928	112	112	113	113	104	.....	.....	.....	.....	.....	.....	.....	.....

Of twenty-four important agricultural commodities, only two, barley and horses, sold for less than their pre-war average price.

Although the potash index is considerably below the pre-war level, the prices of some of the potash salts are only slightly below pre-war prices. In 1926 the potash index was 86. The index numbers of the prices of the individual salts for 1926 were: muriate, 84; sulfate, 91; sulfate of potash magnesia, 99; manure salts, 81; kainit, 92.

During the post-war period, one of the most important features of the fertilizer situation was the relatively low prices of fertilizer ingredients. Fertilizer materials were below the general level of wholesale prices of all commodities. Many were also below the level of farm prices in the United States. For the five years 1922 to 1926, organic ammoniates averaged 133 per cent of pre-war prices, phosphoric acid 105 per cent, mineral ammoniates 100 per cent, and potash 83 per cent. Potash has been consistently cheaper than the other fertilizer ingredients.

INDEX NUMBERS OF WHOLESALE PRICES OF TWELVE FERTILIZER MATERIALS

A weighted index number of the prices of twelve fertilizer materials was made. It was computed from the phosphoric-acid index, the mineral-ammoniate index, the organic-ammoniate index, and the potash index, which have been discussed in preceding pages. The materials were weighted according to their importance in making up the fertilizer tonnage in the United States. The weights were as follows:[9]

A. Phosphoric-acid group: superphosphate (acid phosphate), 4,600,000 tons; raw ground bones, 102,000 tons; ground steamed bones, 57,000 tons.

B. Mineral-ammoniate group: nitrate of soda, 153,000 tons; sulfate of ammonia, 143,000 tons.

C. Organic-ammoniate group: cottonseed meal, 280,000 tons; tankage, 11 per cent ammonia and 15 per cent bone phosphate, 790,000 tons; fish scrap, 260,000 tons.

D. Potash group: muriate of potash, 215,000 tons; sulfate of potash, 41,000 tons; manure salts, 209,000 tons; kainit, 405,000 tons.

The most striking features of the index numbers of prices of twelve fertilizer materials are: the comparative stability for the sixteen years 1900 to 1915; the rise during inflation, 1915 to 1920; the collapse with

[9] Prices were not available for all of the series for the entire period from 1897 to 1928. The phosphoric-acid index is based on the prices of superphosphate (acid phosphate) and steamed bones for the six years 1897 to 1902, and for 1926; for the four years 1903, 1904, 1907, and 1908, the index is based on the prices of superphosphate (acid phosphate). The mineral-ammoniate index is based on the prices of sulfate of ammonia for the sixty-one months January, 1897, to January, 1902, inclusive. The organic-ammoniate index is based on the prices of ammonia in tankage, cottonseed meal, and fish scrap. For the seven years 1897 to 1903, the prices of ammonia in tankage were not available. For the six years 1904 to 1909, the price of ammonia in tankage was 87.67 per cent of the price of ammonia in blood. The prices of ammonia in tankage used in making the organic-ammoniate index for the seven years 1897 to 1903 are 87.7 per cent of the price of ammonia in blood. The potash index is based on the prices of muriate and sulfate of potash for the four years 1897 to 1900; for the three years 1901 to 1903, the index is based on the prices of muriate, sulfate, and manure salts. The index number of prices of twelve fertilizer materials does not include the potash salts for the six years 1915 to 1920, when there were practically no imports.

deflation, 1920 to 1921; and the comparative stability at low prices for the five years 1922 to 1926 (table 58 and figure 20). The ten-year period 1898 to 1907 was a period of rising fertilizer prices. The index numbers

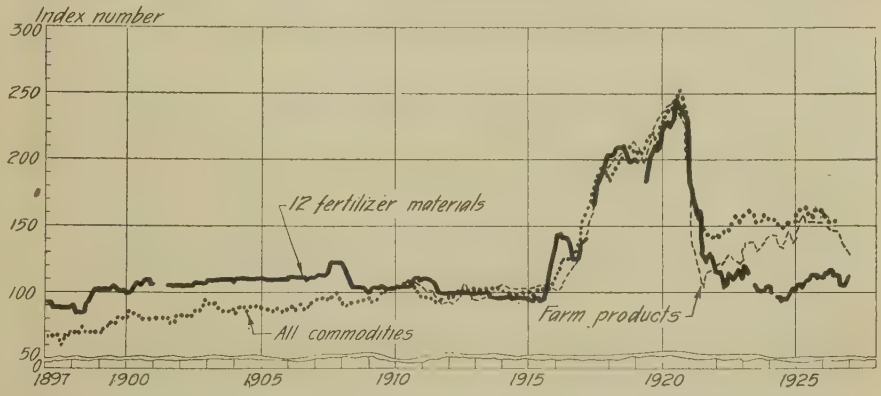

FIGURE 20. INDEX NUMBERS OF WHOLESALE PRICES OF TWELVE FERTILIZER MATERIALS, ALL COMMODITIES, AND FARM PRODUCTS, 1897 TO 1927

Since 1921 the index numbers of prices of twelve fertilizer materials have been lower than those of all commodities and those of farm products

increased from 84 in March, 1898, to 121 in September, 1907. For the following eight years, 1907 to 1914, prices gradually declined, reaching a low point, 93, in July, 1914. As there was a consistent increase in the general price level for the seventeen years 1897 to 1913, fertilizer became cheap relative to other commodities. Farm prices increased even more rapidly than did the general price level, so that the purchasing power of farm products in terms of fertilizer materials increased. That is, there was an increase in the amount of fertilizer materials that could be purchased with a pound of cotton, tobacco, potatoes, or corn. This was accompanied by a rapid growth of the fertilizer tonnage for the fifteen years 1900 to 1914.

During the period of inflation, fertilizer prices increased. In July, 1920, the index number of the prices of twelve fertilizer materials was 243 per cent of pre-war prices. During the deflation period prices fell rapidly. In May, 1922, the index was 101, a decline of 142 points in twenty-two months. After a slight recovery in prices in the fall of 1922, prices declined until in May, 1924, they were only 92 per cent of the pre-war average. Since then they have increased slightly.

For the five years 1922 to 1926, the prices of fertilizer materials averaged 107 per cent of the pre-war level. The index number of wholesale prices for the same period averaged 155. Fertilizer materials have been, and still are, very cheap in comparison with other commodities. During the period from 1922 to 1926, the purchasing power of fertilizers was only 68 per cent of the pre-war level (table 59).

TABLE 58. INDEX NUMBERS OF PRICES OF TWELVE FERTILIZER MATERIALS, 1897 TO 1928
(Potash omitted 1915–1920.* Corresponding months 1910–1914 = 100†)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	92	92	92	91	88	87	88	88	88	88	88	88	89
1898	88	88	84	84	85	91	102	102	102	101	102	101	94
1899	102	102	102	102	103	104	103	103	103	100	96	96	101
1900	102	103	107	106	.....	105	106	109	109	109	108	.....	107
1901	.....	.....	.....	.....	.....	.....	105	105	104	105	105	104	.....
1902	105	105	105	106	106	106	106	106	105	106	106	106	106
1903	107	107	109	109	109	109	109	109	108	108	109	108	109
1904	109	109	109	109	109	109	109	109	109	109	110	110	109
1905	110	109	109	109	109	109	109	108	108	108	109	109	109
1906	109	109	110	110	110	110	110	110	109	110	110	110	110
1907	111	111	111	112	112	112	112	.....	121	121	121	120	115
1908	119	114	103	100	101	102	102	102	102	102	98	97	103
1909	102	102	103	103	103	104	104	102	101	101	102	103	102
1910	103	103	103	103	103	103	106	109	109	110	110	109	106
1911	110	110	109	108	106	107	101	99	99	99	99	98	104
1912	98	98	99	99	99	100	99	98	98	99	98	98	99
1913	98	98	98	98	98	99	99	94	94	94	94	96	97
1914	96	96	96	96	96	94	93	94	94	94	94	94	95
1915	93	93	94	94	93	.....	91	90	93	104	135	141	101
1916	142	141	141	140	140	140	139	124	125	126	129	131	135
1917	136	138	.....	.....	161	171	180	183	191	203	195	.....	169
1918	.....	.....	.....	.....	207	208	209	208	209	210	193	200	.....
1919	198	.....	.....	.....	.....	181	192	204	210	207	209	220	.....
1920	225	.....	.....	.....	222	229	243	240	236	230	203	188	224
1921	175	163	158	149	138	129	123	125	128	127	115	112	136
1922	113	113	114	.....	101	104	112	110	109	116	108	120	110
1923	114	.....	.....	.....	106	103	102	101	100	104	103	100	107
1924	.....	.....	95	94	92	93	95	102	102	100	104	106	98
1925	105	105	105	104	109	109	112	112	112	111	111	110	109
1926	113	113	.....	116	112	112	114	113	112	105	103	103	111
1927	104	.....	.....	.....	107	102	105	104	105	106	108	108	105
1928	109	110	110	111	111	.....	.....	.....	.....	.....	.....	.....	.....

* There were practically no imports of potash during the period from 1915 to 1920.
† For phosphoric acid, 1910–1914 = 100; for other materials, corresponding months 1910–1914 = 100.

TABLE 59. INDEX NUMBERS OF THE PURCHASING POWER OF TWELVE FERTILIZER MATERIALS, 1897 TO 1926

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	135	135	135	136	133	132	133	128	124	126	126	126	131
1898	126	124	118	118	112	128	146	146	146	144	146	142	132
1899	144	140	140	138	139	139	136	134	129	123	119	116	133
1900	123	123	127	126	.....	130	129	135	133	135	133	.....	130
1901	.....	.....	.....	.....	.....	.....	131	130	127	128	127	124	.....
1902	127	127	128	126	125	123	123	125	122	115	119	118	123
1903	118	118	124	124	127	127	127	127	124	126	128	127	125
1904	125	122	124	125	128	128	128	127	125	125	124	124	125
1905	125	122	124	124	125	125	125	123	124	124	124	122	124
1906	122	122	125	124	122	122	126	124	121	120	118	117	122
1907	119	117	118	119	117	117	115	.....	125	123	129	130	121
1908	131	127	114	110	111	112	111	111	111	110	104	102	112
1909	109	107	108	106	105	105	105	102	100	99	98	98	104
1910	99	99	97	96	98	99	102	106	107	111	113	112	103
1911	115	117	115	117	115	116	109	103	102	102	103	103	109
1912	102	101	100	97	97	99	98	96	95	96	96	96	98
1913	96	96	96	96	97	98	97	92	90	91	92	96	95
1914	96	96	96	97	97	96	94	91	91	95	95	96	95
1915	93	92	93	93	91	.....	89	88	92	100	127	128	98
1916	123	121	117	114	112	112	111	96	95	91	87	86	105
1917	87	86	.....	.....	87	90	94	95	100	109	105	.....	94
1918	.....	.....	.....	.....	107	107	104	102	100	102	93	97	.....
1919	98	.....	.....	.....	.....	87	89	93	98	96	95	97	.....
1920	95	.....	.....	.....	88	92	99	102	103	107	102	103	97
1921	101	100	100	99	93	90	85	87	89	88	80	79	91
1922	80	78	79	.....	67	68	71	70	70	74	68	75	72
1923	72	.....	.....	.....	67	66	67	66	64	67	66	65	68
1924	.....	.....	62	62	61	63	63	67	67	65	67	66	64
1925	64	64	64	65	69	68	69	69	69	69	69	69	67
1926	71	72	.....	75	72	72	74	74	73	69	.....	.....	.....

FERTILIZER MANUFACTURING

The manufacture of mixed fertilizers consists in assembling and processing the fertilizer materials and mixing the ingredients in the various combinations which the trade requires. The processing is both mechanical and chemical. Mechanical treatment is the grinding of the materials, while chemical treatment is primarily the treating of phosphate rock and certain ammoniates with sulfuric acid to make the plant nutrients more readily available.

Mixed-fertilizer plants may be divided into two groups, wet mixers and dry mixers. Wet mixers are equipped with machinery for grinding phosphate rock and treating it with sulfuric acid. They may be equipped with lead chambers for producing their own sulfuric acid, or this may be purchased. Dry mixers are equipped only to mix the prepared materials in dry form.

LOCATION OF PLANTS AND VALUE OF PRODUCTS

The fertilizer plants in the United States are located mainly in the southeastern States and along the Atlantic seaboard, where fertilizer consumption is greatest (table 60 and figure 21). Georgia has the largest

TABLE 60. FERTILIZER PLANTS, AND VALUE OF PRODUCTS, BY STATES, 1921

State	Number of plants	Per cent of total number	Value of products	Per cent of total value of products	Value of products per plant
Maryland	44	7.5	$23,431,375	13.0	$532,531
Georgia	138	23.5	22,791,857	12.6	165,158
Virginia	47	8.0	15,932,812	8.8	338,996
North Carolina	57	9.7	14,669,979	8.1	257,368
New Jersey	19	3.2	12,929,120	7.2	680,480
South Carolina	50	8.5	12,496,730	6.9	249,935
Florida	17	2.9	9,744,093	5.4	573,182
Ohio	22	3.7	8,613,161	4.8	391,507
Maine	9	1.5	7,011,819	3.9	779,091
Pennsylvania	28	4.8	6,975,480	3.9	249,124
Illinois	14	2.4	4,738,923	2.6	338,494
Alabama	44	7.5	4,195,363	2.3	95,349
California	12	2.0	4,121,982	2.3	343,498
Tennessee	10	1.7	3,527,059	2.0	352,706
Indiana	11	1.9	3,506,803	1.9	318,800
Connecticut	5	0.9	3,096,618	1.7	619,324
Louisiana	7	1.2	2,846,367	1.6	406,624
All other States	54	9.2	19,745,248	11.0	365,653
Total or average	588	100.0	$180,374,789	100.0	$306,760

FIGURE 21. LOCATION OF FERTILIZER PLANTS IN THE UNITED STATES IN 1921

The fertilizer plants are located primarily in the southeastern States and along the Atlantic seaboard. Each dot represents two plants

number of plants — 138, or 24 per cent of the total. The six States, Georgia, North Carolina, South Carolina, Virginia, Maryland, and Alabama, have 65 per cent of the fertilizer plants. In the eastern corn-belt States, Ohio, Illinois, and Indiana, there are 47 plants, or about 8 per cent of the total. West of the Mississippi River there are only 44 plants.

The average value of products per plant in 1921 was $306,760. In the States of Maine, New Jersey, Connecticut, Florida, and Maryland, the average value of products per plant was over $500,000. Georgia and Alabama had the lowest value of products per plant, $165,000 and $95,000 respectively. In these States the fertilizer plants supply a local demand, and are small because the applications per acre are light. In the potato section of Maine and the tobacco section of Connecticut, there is a very intensive use of fertilizer and a large tonnage is used in a comparatively small area. Thus the fertilizer establishments in these States are relatively large.

Maryland, New Jersey, and Florida are distributing centers. Maryland and New Jersey have the advantages of cheap water transportation, nearness to the industrial centers where sulfuric acid and sulfate of ammonia are produced, and a relatively short rail shipment to the important consuming centers along the Atlantic coast. In 1921 the value of the products

of fertilizer plants in the seven States, Maryland, Georgia, Virginia, North Carolina, New Jersey, South Carolina, and Florida, was 62 per cent of the United States total. The value of the products of fertilizer plants in the three eastern corn-belt States was 9.3 per cent of the total.

SEASONAL VARIATION IN EMPLOYMENT IN FERTILIZER ESTABLISHMENTS

The manufacture of commercial fertilizers is highly seasonal (tables 61 and 62). Employment is greatest in February, March, and April.

TABLE 61. NUMBER OF WAGE EARNERS, BY MONTHS, IN FERTILIZER ESTABLISHMENTS IN THE UNITED STATES, 1914, 1919, 1921, AND 1923

Month	1914	1919	1921	1923
January	22,571	27,808	17,736	18,642
February	30,647	31,043	19,913	24,958
March	38,332	38,357	26,745	30,707
April	32,977	36,465	24,591	25,141
May	21,793	23,856	13,475	16,970
June	18,286	21,071	12,670	13,610
July	17,603	21,731	12,346	13,818
August	18,041	22,500	13,887	15,181
September	20,863	25,205	16,542	17,280
October	18,249	22,028	14,876	15,904
November	17,564	21,897	15,470	15,508
December	16,854	23,591	14,528	15,142
Average number employed during year	22,815	26,296	16,898	18,572

TABLE 62. INDEX NUMBERS OF SEASONAL VARIATION IN NUMBERS OF WAGE EARNERS EMPLOYED IN FERTILIZER ESTABLISHMENTS, 1914, 1919, 1921, AND 1923

(Yearly average = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1914	99	134	168	145	96	80	77	79	91	80	77	74
1919	106	118	146	139	91	80	83	86	96	84	83	90
1921	105	118	158	146	80	75	73	82	98	88	92	86
1923	100	134	165	135	91	73	74	82	93	86	84	82

The index numbers of seasonal variation in the numbers of wage earners for these three months in 1923 were 134, 165, and 135, respectively. There is also a peak of secondary importance in September. Employment tends to be lowest in June and July. The bulk of the fertilizer sales are in the spring, just prior to planting time. There is also a considerable fall trade in those sections where fertilizer is used on fall-sown crops, resulting in an increase in employment in August and September to

handle this trade. A comparison of the index numbers of seasonal variation in the number of wage earners for the years 1914, 1919, 1921, and 1923 does not show any decided changes in the distribution of employment throughout the year.

GROWTH AND CHANGES IN FERTILIZER MANUFACTURE

During the sixty years from 1859 to 1919, there was practically an uninterrupted growth in the manufacture of commercial fertilizer. The number of wage earners increased from 308 in 1859 to 26,296 in 1919 (table 63). The value of products increased 315 times during the same period. Part of this change was due to changes in the physical volume of products handled, and part to the price of the products.

TABLE 63. NUMBER OF FERTILIZER PLANTS AND OF WAGE EARNERS IN THE UNITED STATES, 1859 TO 1923

Year	Number of plants	Average number of wage earners during the year	Value of product	Fertilizer tonnage
1859	47	308	$ 891,000	.....
1869	126	2,501	5,815,118	.....
1879	364	8,598	23,650,795	.....
1889	390	9,026	39,180,844	.....
1899	422	11,581	44,657,385	.....
1904	399	14,184	56,541,253	3,360,000
1909	550	18,310	103,960,213	4,912,120
1914	784	22,815	153,196,152	7,340,528
1919	600	26,296	281,143,587	6,858,322
1921	588*	16,898*	180,374,789*	5,183,523
1923	573*	18,572*	183,088,751*	6,639,208

*Plants with products valued at less than $5000 are not included in the figures for 1921 and 1923.

The number of plants increased from 47 in 1859 to 422 in 1899. The census of 1904 reported only 399 establishments, a decrease of 23 for the five years from 1899 to 1904. This decrease was probably due to consolidation. Some of the large fertilizer corporations were organized at that time.

In 1914 there were 784 establishments, but five years later, in 1919, there were only 600. This decline was a result of the low value of cotton in 1914 and 1915, the difficulty of obtaining certain fertilizer materials during the World War, lack of shipping facilities, and scarcity of labor. There were 15 fewer plants in 1923 than in 1921. This decline was caused by the depression which existed in the fertilizer trade during that period.

For the forty-six years 1859 to 1904 there was a general upward trend in the number of wage earners per plant, this increasing from 6.6 in 1859 to 35.5 in 1904 (table 64). From 1904 to 1923 there was no consistent

TABLE 64. VALUE OF PRODUCTS AND NUMBER OF WAGE EARNERS PER FERTILIZER PLANT IN THE UNITED STATES, 1859 TO 1923

Year	Number of wage earners per plant	Horse power per plant	Value of products per plant	Value added by manufacture, per plant	Fertilizer tonnage per plant
1859	6.6	....	.....	.....	.....
1869	19.8	23	$ 46,152	$ 15,929	.....
1879	23.6	....	64,975	22,131	.....
1889	23.1	....	100,464	36,069	.....
1899	27.4	92	105,823	37,201	.....
1904	35.5	120	141,707	43,241	8,421
1909	33.3	118	189,019	62,615	8,931
1914	29.1	146	195,403	57,706	9,363
1919	43.8	210	468,573	160,172	11,430
1921	28.7	....	306,760	60,198	8,816
1923	32.4	282	319,527	96,175	11,587

increase, but in 1919 there were 43.8 wage earners per plant. This was one of the boom years in the fertilizer trade and the output per plant was increased by employing extra labor. Two years later, in 1921, there were only 28.7 wage earners per plant. With the depression there was a decided tendency to reduce expenses for labor.

The horse power per plant increased from 23 in 1869 to 282 in 1923.

For the forty-six-year period 1869 to 1914, there was a general upward trend in the cost of materials and in the value of products per plant. In 1919 there was a marked increase due to the high prices and the large tonnage. For the two years 1921 and 1923, the cost of materials and the value of products were less than in 1919, but were 167 per cent and 160 per cent, respectively, of the pre-war averages. The value added by manufacture, however, was only 134 per cent of that for 1914.

In 1923 the average tonnage output per plant was 11,587 tons, or 124 per cent of the pre-war output (1914=100). The general trend has been for the tonnage per plant to increase. In 1921, when there was a severe depression in the fertilizer industry, the output per plant was only 94 per cent of the pre-war level.

The general upward trend in the tonnage of fertilizer sold per wage earner (table 65) indicates an increasing efficiency in the use of human labor.

TABLE 65. FERTILIZER TONNAGE AND HORSE POWER PER WAGE EARNER IN FERTILIZER PLANTS, 1899 TO 1923

Year	Tonnage per wage earner	Horse power per wage earner	Tonnage per horse power
1899	...	3.3	..
1904	237	3.4	70
1909	268	3.5	76
1914	322	5.0	64
1919	261	4.8	54
1921	307	...	..
1923	357	8.7	41

This has been made possible by a greater use of mechanical power. The horse power per wage earner has increased, while the tonnage of fertilizer per horse power has decreased. Since human labor is more expensive than mechanical power, there has been a tendency to increase the use of machinery even though the tonnage per mechanical horse power decreases.

For the seven census years from 1869 to 1914, the cost of materials averaged 66.7 per cent of the total value of products, and salaries and wages averaged 12.3 per cent (table 66). These two items together made up

TABLE 66. RELATION OF COST OF MATERIALS, SALARIES AND WAGES, AND VALUE ADDED BY MANUFACTURE, TO TOTAL VALUE OF PRODUCTS IN FERTILIZER PLANTS, 1869 TO 1923

Year	Per cent cost of materials is of total value of product	Per cent salaries and wages are of total value of product	Per cent value added by manufacture is of total value of product	Per cent salaries and wages are of value added by manufacture
1869	65.5	13.2	34.5	38.2
1879	65.9	11.2	34.1	32.9
1889	64.1	11.9	35.9	33.2
1899	64.8	14.1	35.2	40.2
1904	69.5	12.5	30.5	40.9
1909	66.9	11.4	33.1	34.5
1914	70.5	11.6	29.5	39.3
1919	65.8	13.1	34.2	38.4
1921	80.4	14.3	19.6	73.0
1923	69.9	14.3	30.1	47.4

about 80 per cent of the total value of products, leaving 20 per cent to cover the other costs of operation. In 1921, when there was a severe depression in the fertilizer industry, the cost of raw materials and salaries and wages

made up 94.7 per cent of the value of the products, as compared with a pre-war average of 80. The margin was very low and many companies operated at a loss.

In 1923 the price of raw materials was 69.9 per cent of the total value of products, which is approximately the same relationship as prevailed in the pre-war period. Salaries and wages, however, were 47 per cent of the value added by manufacture, compared with a pre-war average of 39 per cent. Even though the fertilizer tonnage was greater in 1923 than in 1921, profits in the industry were small, since a larger part of the gross margin was required to pay wages than prior to the war.

In 1904 the cost of materials, the value added by manufacture, the salaries and wages, and the value of products per ton, were in about the same relation to one another as in 1914 (tables 67 and 68). Five years

TABLE 67. COST OF MATERIALS, VALUE ADDED BY MANUFACTURE, AND VALUE OF PRODUCTS PER TON, FOR FERTILIZER PLANTS, 1904 TO 1923

Year	Cost of materials per ton	Value added by manufacture, per ton	Salaries and wages per ton	Value added by manufacture other than wages, per ton	Value of products per ton
1904.....	$11.69	$ 5.13	$2.10	$3.03	$16.83
1909.....	14.15	7.01	2.42	4.59	21.16
1914.....	14.71	6.16	2.42	3.74	20.87
1919.....	26.98	14.01	5.39	8.62	40.99
1921.....	27.97	6.83	4.99	1.84	34.81
1923.....	19.28	8.30	3.93	4.37	27.58

TABLE 68. INDEX NUMBERS OF COST OF MATERIALS, VALUE ADDED BY MANUFACTURE, AND VALUE OF PRODUCTS PER TON, 1904 TO 1923

(1914 = 100)

Year	Cost of materials per ton	Value added by manufacture, per ton	Salaries and wages per ton	Value added by manufacture other than wages, per ton	Value of products per ton
1904.....	79	83	87	81	81
1909.....	96	114	100	123	101
1914.....	100	100	100	100	100
1919.....	183	227	223	230	196
1921.....	190	111	206	49	167
1923.....	131	135	162	117	132

later, 1909, the cost of materials (96), salaries and wages (100), and value of products (101), were in approximate adjustment. However, the value added by manufacture was 114, while the value added by manufacture other than salaries and wages was 123. Apparently, the fertilizer business was profitable. During the following five years, 1909 to 1914, the number of establishments increased from 550 to 784. This rapid increase indicates that previous profits were large.

In 1919 the value added by manufacture was 227 per cent of the pre-war average, and the value added by manufacture other than salaries and wages was 230 per cent. The purchasing powers were 108 and 110, respectively. The number of plants did not increase.

In 1923 the cost of materials (131), the value added by manufacture (135), and the value of products (132), were in about their pre-war relationships. Salaries and wages per ton, however, were 162, and the value added by manufacture other than salaries and wages was only 117. Even though the gross margin was in its pre-war relation with the cost of materials and the value of products, salaries and wages were a larger part of the gross margin. Therefore, the amount left to pay operating costs other than wages, and interest on indebtedness, was very low.

The purchasing power of the gross margin other than wages was only 33 per cent of the pre-war level in 1921 and 75 per cent in 1923 (table 69). This is one of the factors which has caused the depression in the fertilizer industry.

TABLE 69. PURCHASING POWER OF COST OF MATERIALS, VALUE ADDED BY MANUFACTURE, AND VALUE OF PRODUCTS PER TON, 1904 TO 1923

(1914 = 100)

Year	Cost of materials	Value added by manufacture	Salaries and wages	Value added by manufacture other than wages	Value of products
1904	91	95	100	93	93
1909	97	115	101	124	102
1914	100	100	100	100	100
1919	87	108	106	110	93
1921	127	74	137	33	111
1923	83	86	103	75	84

The value of the real estate and equipment of three large fertilizer corporations increased gradually from 1913 to 1922; in 1923 and 1924 there was a slight decline (table 70). The bonded indebtedness decreased slightly

TABLE 70. ASSETS, LIABILITIES, AND PROFITS OF THREE LARGE FERTILIZER CORPORATIONS, 1913 TO 1924*

Year	Real estate and equipment	Current assets	Bonded debt	Current liabilities	Profits	Ratio of bonded debt to value of real estate and equipment
1913.....	$ 96,380,930	$ 68,160,867	$36,963,000	$20,490,720	.....	1:2.6
1914.....	98,240,638	73,975,534	42,724,800	21,453,723	$ 5,701,000	2.3
1915.....	99,485,363	79,486,474	46,900,200	20,736,012	7,229,333	2.1
1916.....	101,704,871	72,790,830	46,518,720	11,164,958	10,893,267	2.2
1917.....	104,017,744	84,308,697	45,186,405	22,226,045	10,669,235	2.3
1918.....	107,078,062	113,572,794	44,546,985	42,203,759	17,540,710	2.4
1919.....	109,215,429	127,588,866	38,713,940	46,459,252	12,359,785	2.8
1920.....	113,962,097	139,087,677	36,026,937	54,993,073	14,683,495	3.2
1921.....	122,516,569	145,326,570	71,925,900	61,298,555	†(11,841,176)	1.7
1922.....	125,126,170	129,246,553	70,286,900	43,516,074	†(3,344,511)	1.8
1923.....	116,844,565	95,235,280	80,615,800	17,190,624	†(3,620,112)	1.4
1924.....	115,345,973	84,834,672	78,716,800	10,002,674	†(5,950,280)	1.5

* Data from *Moody's Analyses of Investments.*
† Deficit.

from 1915 to 1920, but with the depression of 1921 it practically doubled. Thus the ratio of the bonded debt to the value of real estate and equipment in 1923 and 1924 was only 1.45, as compared with a pre-war average of 2.45. That is, in 1913–1914 for every dollar of bonded debt there was $2.45 of real estate and equipment, while in 1923–1924 the value of real estate and equipment was only $1.45 per dollar of bonded debt.

The profits of these three corporations increased throughout the war and inflation period. In 1921, however, the companies incurred large losses. The combined deficit for 1921 was $11,841,000 as compared with a profit of $14,683,000 for 1920. The companies operated at a loss during the four years 1921 to 1924 inclusive. These losses have made necessary the financial reorganization of some companies.

For six years the American farmer has suffered from low prices and high wage costs. The consumption of fertilizer is adversely affected by these two factors. High city wages have increased the cost of manufacturing fertilizer, and have tended to reduce the margin left for paying operating costs other than wages, and interest on indebtedness. The present relations between the value added by manufacture, salaries and wages, and value of product, cannot continue. The margin in 1921 and 1923 above the cost of materials and wages is not sufficient to maintain the industry.

FERTILIZER CONSUMPTION

REGIONS OF CONSUMPTION

The sale of fertilizer in the United States for the twenty-six years 1900 to 1925 is divided into two major periods: first, a period of rapid growth; and secondly, a period characterized by large annual fluctuations and little growth (figure 22). The fifteen years 1900 to 1914 were a period of rapid

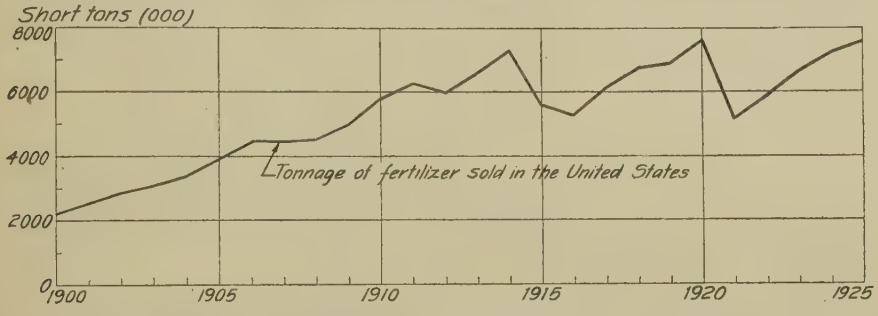

FIGURE 22. FERTILIZER TONNAGE IN THE UNITED STATES, 1900 TO 1925

The tonnage increased rapidly from 1900 to 1914. Since 1914 there have been wide annual fluctuations

growth in fertilizer tonnage, the average annual increase being 350,000 tons; for the two years 1907 and 1908, however, there was practically no increase, and in 1912 there was a decrease. During the twelve years 1914 to 1925, there was no consistent increase in the fertilizer tonnage but the fluctuations from year to year were much larger than in the preceding period. The largest fluctuations occurred in 1915 and 1921, when there were decreases of 1,800,000 and 2,400,000 tons, respectively. These decreases followed the big cotton crop of 1914 and the deflation of 1920.

For the seventeen years 1909 to 1925, the South Atlantic States[10] consumed about 56 per cent of the total fertilizer tonnage; the North Atlantic States,[11] 18 per cent; the South Central States,[12] 14 per cent; the North Central States east of the Mississippi River,[13] 8 per cent; the North Central States west of the Mississippi River,[14] 1 per cent; and the Far Western States,[15] 1 per cent.

About 75 per cent of the total tonnage is consumed along the Atlantic seaboard. In general, this is a region where the soils are of comparatively

[10] South Atlantic States: Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida.

[11] North Atlantic States: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania.

[12] South Central States: Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, Arkansas.

[13] North Central States east of the Mississippi River: Ohio, Indiana, Illinois, Michigan, Wisconsin.

[14] North Central States west of the Mississippi River: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

[15] Far Western States: Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Idaho, Washington, Oregon, California.

low natural fertility and where the rainfall is heavy. In a large part of this area the primary source of farm income is from the sale of cotton, tobacco, potatoes, and truck crops.

TRENDS IN THE FERTILIZER TONNAGE

While the tonnage of fertilizer sold fluctuates from year to year, there have been no decided long-time changes in the consumption of fertilizer in the important consuming regions (table 71 and figures 23 and 24).

TABLE 71. ANNUAL CHANGES IN FERTILIZER TONNAGE FOR REGIONS IN THE UNITED STATES, 1909 TO 1925

Region	Average annual consumption	Average annual increase in consumption	Per cent increase in trend	Per cent of United States increase
	(Tons)	(Tons)		
United States	6,289,882	67,972	1.08	100.00
South Atlantic States	3,537,882	19,507	0.55	28.77
North Atlantic States	1,164,294	8,787	0.75	12.96
South Central States	889,824	14,946	1.68	22.05
North Central States east of Mississippi River	526,000	19,461	3.70	28.71
North Central States west of Mississippi River	71,941	2,020	2.81	2.98
Far Western States	68,706	4,272	6.22	6.30

During the seventeen years 1909 to 1925, the United States tonnage increased 67,972 tons per annum, a yearly increase of 1.08 per cent. The tonnage used in the South Atlantic States and the North Atlantic States increased at the rate of 0.55 per cent and 0.75 per cent, respectively. The yearly increase was small in comparison with the average annual consumption. Since the increase in these two regions was not so rapid as for the United States as a whole, the percentage of the total tonnage consumed in these regions declined during the seventeen-year period 1909 to 1925.

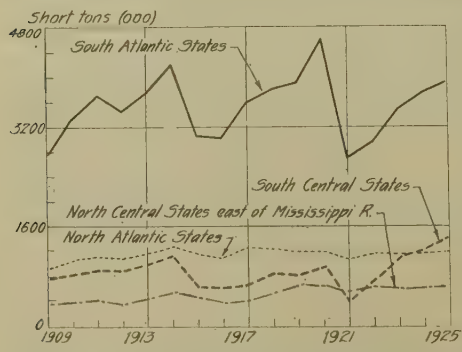

FIGURE 23. FERTILIZER TONNAGE IN REGIONS OF THE UNITED STATES, 1909 TO 1925

The tonnage is largest in the South Atlantic States

Consumption in the South Central States and in the North

Central States east of the Mississippi River increased at a faster rate, 1.68 and 3.70 per cent, respectively. Since the tonnage in these regions increased faster than did the United States tonnage, the percentage of the total tonnage used in these States increased. There were large percentage increases in the regions west of the Mississippi River, 2.81 per cent for the North Central States and 6.22 per cent for the Far Western States. The consumption in these regions is so small that it is relatively unimportant.

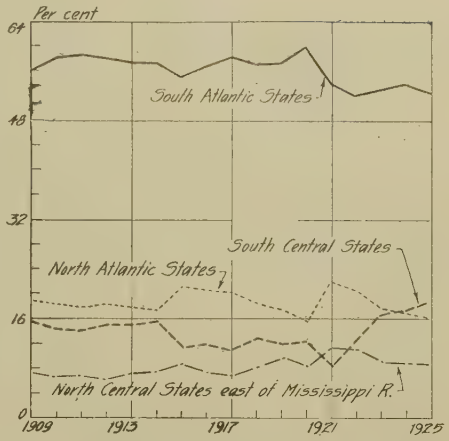

FIGURE 24. PERCENTAGE OF THE FERTILIZER TONNAGE USED IN DIFFERENT SECTIONS OF THE UNITED STATES, 1909 TO 1925

Approximately 56 per cent of the tonnage is used in the South Atlantic States, 18 per cent in the North Atlantic States, 14 per cent in the South Central States, and 8 per cent in the North Central States east of the Mississippi River

The average annual increase in the United States tonnage was 67,972 tons. The increase in the South Atlantic States was 19,507 tons, or 28.8 per cent of the United States increase. The tonnage in the North Atlantic States increased 8787 tons, or 12.96 per cent of the total increase. Only 41 per cent of the increase in fertilizer sold was in regions which consume 75 per cent of the total tonnage. In the South Central States and the North Central States east of the Mississippi River, the tonnage increases were 14,946 and 19,461 tons, respectively; 51 per cent of the increase was in these two regions, which consumed only 22 per cent of the total tonnage. Nine per cent of the increase was in the Far Western States and in the North Central States west of the Mississippi River.

The largest actual increase in tonnage was in regions where the tonnages are relatively small. This indicates that the use of fertilizer was expanding through more general use on new lands, rather than through a more intensive use on lands where fertilizer has been used for many years.

The trends in the fertilizer consumption in the various regions differ considerably. Similarly, the trends for the various States within a region may differ. In the South Atlantic States (table 72), the tonnage increased rapidly in North Carolina (4.06 per cent per annum) and in Florida (5.30 per cent per annum). The increase in Florida was probably due to the expansion in the production of vegetables and citrus fruits. In North Carolina, cotton production is expanding and fertilizer consumption has increased. Boll-weevil damage is not so serious in that State as it is in most of the southern States along the Atlantic seaboard. The decreases in

TABLE 72. ANNUAL CHANGES IN FERTILIZER TONNAGE IN THE SOUTH ATLANTIC STATES, 1909 TO 1925

State	Average annual consumption	Per cent of United States tonnage	Average annual increase in consumption	Per cent increase in trend
	(Tons)		(Tons)	
South Atlantic States	3,537,882	56.2	19,507	0.55
Delaware	38,625	0.61	518	1.34
Maryland	162,485	2.58	141	0.09
Virginia	411,736	6.55	6,274	1.52
West Virginia	44,522	0.71	1,553	0.35
North Carolina	860,109	13.67	34,900	4.06
South Carolina	874,354	13.90	(–9,703)	(–1.11)
Georgia	896,917	14.26	(–27,373)	(–3.05)
Florida	249,149	3.96	13,206	5.30

tonnage in South Carolina (–1.11 per cent) and in Georgia (–3.05 per cent) were due primarily to the unprofitableness of cotton production. Boll-weevil damage has been a serious factor in those States.

Consumption in Delaware and in Virginia increased only slightly faster than did the United States tonnage, while the tonnage in Maryland and in West Virginia remained practically constant.

In the North Atlantic States (table 73), the largest annual increases in tonnage were in Maine (3271 tons), in New Jersey (2150 tons), and in Connecticut (2129 tons). In Maine, the fertilizer is used primarily on

TABLE 73. ANNUAL CHANGES IN FERTILIZER TONNAGE IN THE NORTH ATLANTIC STATES, 1909 TO 1925

State	Average annual consumption	Per cent of United States tonnage	Average annual increase in consumption	Per cent increase in trend
	(Tons)		(Tons)	
North Atlantic States	1,164,294	18.5	8,787	0.75
Maine	155,665	2.47	3,271	2.10
New Hampshire	16,412	0.26	(–7)	(–0.04)
Vermont	16,500	0.26	66	0.40
Massachusetts	60,221	0.96	411	0.68
Rhode Island	9,947	0.16	(–116)	(–1.17)
Connecticut	66,626	1.06	2,129	3.20
New York	384,471	6.11	(–86)	(–0.02)
New Jersey	149,756	2.38	2,150	1.44
Pennsylvania	321,269	5.11	1,041	0.32

potatoes; in Connecticut, on tobacco and truck crops; and in New Jersey, on potatoes and truck crops. The tonnage in New Hampshire, Vermont, Massachusetts, New York, and Pennsylvania remained practically constant. The largest increases in tonnage were in those States where a considerable proportion of the farm income is from the sale of crops. In the States where dairying and a more general type of farming prevail, the tonnage remained relatively constant.

In the South Central States (table 74), Arkansas and Texas show the largest percentage increases, 5.68 and 5.28 per cent, respectively. These increases were probably due to the expansion of cotton production. The

TABLE 74. ANNUAL CHANGES IN FERTILIZER TONNAGE IN THE SOUTH CENTRAL STATES, 1909 TO 1925

State	Average annual consumption	Per cent of United States tonnage	Average annual increase in consumption	Per cent increase in trend
	(Tons)		(Tons)	
South Central States	889,824	14.1	14,946	1.68
Kentucky	80,294	1.28	2,230	2.78
Tennessee	90,256	1.43	3,506	3.87
Alabama	376,973	5.99	(–2,113)	(–0.56)
Mississippi	132,545	2.11	4,272	3.22
Louisiana	90,391	1.44	940	1.04
Texas	54,974	0.87	2,904	5.28
Oklahoma	3,812	0.06	(–206)	(–5.40)
Arkansas	60,276	0.96	3,421	5.68

Cotton Belt is moving northward and westward. The tonnage in Tennessee, Mississippi, and Kentucky increased during the period. The tonnage in Alabama declined slightly (–0.56 per cent), due probably to decreased cotton production because of boll-weevil damage.

Ohio had the largest tonnage increase of the eastern corn-belt States (table 75), 12,620 tons per annum, a yearly increase of 5.49 per cent. The tonnage increases in Indiana and Michigan were 4086 and 4397 tons, respectively, giving percentage increases of 2.18 and 5.80. Wisconsin had the largest percentage growth during this period, 11.78 per cent. In Illinois the consumption declined at the rate of 2561 tons per annum, or 10.15 per cent. In this region fertilizer consumption increased most in those States having soils of lowest natural fertility.

TABLE 75. ANNUAL CHANGES IN FERTILIZER TONNAGE IN THE NORTH CENTRAL STATES EAST OF THE MISSISSIPPI RIVER, 1909 TO 1925

State	Average annual consumption	Per cent of United States tonnage	Average annual increase in consumption	Per cent increase in trend
	(Tons)		(Tons)	
North Central States east of Mississippi River	526,000	8.37	19,461	3.70
Ohio	229,868	3.65	12,620	5.49
Indiana	187,242	2.98	4,086	2.18
Illinois	25,235	0.40	(-2,561)	(-10.15)
Michigan	75,761	1.20	4,397	5.80
Wisconsin	7,853	0.12	925	11.78

For the two mid-western States Missouri and Kansas, the percentage increases in tonnage were 2.96 and 2.92 per cent, respectively (table 76). The tonnage in California increased at the rate of 5.03 per cent a year.

TABLE 76. ANNUAL CHANGES IN FERTILIZER TONNAGE IN MISSOURI, KANSAS, WASHINGTON, OREGON, AND CALIFORNIA, 1909 TO 1925

State	Average annual consumption	Per cent of United States tonnage	Average annual increase in consumption	Per cent increase in trend
	(Tons)		(Tons)	
Missouri	56,795	0.90	1,682	2.96
Kansas	6,679	0.11	195	2.92
Washington	7,656	0.12	1,294	16.90
Oregon	5,724	0.09	347	6.06
California	51,413	0.82	2,584	5.03

During the seventeen-year period 1909 to 1925, the important increases in the fertilizer tonnage were in States where cotton production is profitable and where the acreage is expanding, such as North Carolina, Mississippi, Arkansas, and Texas; that is, in the northern and the western part of the Cotton Belt. The tonnage expanded also in the tobacco-producing States, Virginia, Kentucky, and Tennessee. There were comparatively large increases in tonnage in those States which are favorably located for the production of vegetables and potatoes, as Florida, Michigan, Maine, and New Jersey.

The large decreases in tonnage were in the eastern cotton-belt States of Alabama, South Carolina, and Georgia, where cotton production has been less profitable because of boll-weevil damage (table 77).

TABLE 77. ANNUAL CHANGES IN FERTILIZER TONNAGE, 1909 TO 1925

(States arranged in order of increases in tonnage, beginning with the greatest)

State	Average annual consumption	Per cent of United States tonnage	Average annual increase in consumption	Per cent increase in trend
	(Tons)		(Tons)	
United States	6,289,882	100.00	67,972	1.08
North Carolina	860,109	13.67	34,900	4.06
Florida	249,149	3.96	13,206	5.30
Ohio	229,868	3.65	12,620	5.49
Virginia	411,736	6.55	6,274	1.52
Michigan	75,761	1.20	4,397	5.80
Mississippi	132,545	2.11	4,272	3.22
Indiana	187,242	2.98	4,086	2.18
Tennessee	90,256	1.43	3,506	3.87
Arkansas	60,276	0.96	3,421	5.68
Maine	155,665	2.47	3,271	2.10
Texas	54,974	0.87	2,904	5.28
California	51,413	0.82	2,584	5.03
Kentucky	80,294	1.28	2,230	2.78
New Jersey	149,756	2.38	2,150	1.44
Connecticut	66,626	1.06	2,129	3.20
Missouri	56,795	0.90	1,682	2.96
West Virginia	44,522	0.71	1,553	0.35
Washington	7,656	0.12	1,294	16.90
Pennsylvania	321,269	5.11	1,041	0.32
Louisiana	90,391	1.44	940	1.04
Wisconsin	7,853	0.12	925	11.78
Delaware	38,625	0.61	518	1.34
Massachusetts	60,221	0.96	411	0.68
Oregon	5,724	0.09	347	6.06
Kansas	6,679	0.11	195	2.92
Maryland	162,485	2.58	141	0.09
Vermont	16,500	0.26	66	0.40
New Hampshire	16,412	0.26	(-7)	(-0.04)
New York	384,471	6.11	(-86)	(-0.02)
Rhode Island	9,947	0.16	(-116)	(-1.17)
Oklahoma	3,812	0.06	(-206)	(-5.40)
Alabama	376,973	5.99	(-2,113)	(-0.56)
Illinois	25,235	0.40	(-2,561)	(-10.15)
South Carolina	874,354	13.90	(-9,703)	(-1.11)
Georgia	896,917	14.26	(-27,373)	(-3.05)

VARIABILITY OF THE FERTILIZER TONNAGE

The fertilizer tonnage varies from year to year. The coefficient of variability of the United States tonnage is 12.95 (table 78). Consumption in the North Atlantic States is more constant, the coefficient of variability

TABLE 78. STANDARD DEVIATION AND COEFFICIENT OF VARIABILITY OF FERTILIZER CONSUMPTION, BY REGIONS

Region	Average annual consumption, 1909 to 1925	Standard deviation	Coefficient of variability
	(Tons)	(Tons)	
United States	6,289,882	814,570	12.95
South Atlantic States	3,537,882	499,750	14.13
North Atlantic States	1,164,294	83,560	7.18
South Central States	889,824	235,510	26.47
North Central States east of Mississippi River	526,000	110,410	20.99
North Central States west of Mississippi River	71,941	25,070	34.85
Far Western States	68,706	24,060	35.02

being only 7.18. The variability in the South Atlantic States is considerably higher, 14.13. Although a large variety of crops are grown in these States, cotton and tobacco predominate. In fact, it is a one-crop area and is less diversified than the North Atlantic region. In the South Central States the farm income is primarily from cotton and the tonnage is much more variable, the coefficient being 26.47. In localities where the income is primarily from one crop, the variability of the tonnage is usually large. Fluctuations in the value per acre of the crop on which fertilizer is used cause fluctuations in the tonnage of fertilizer.

The variability in the fertilizer tonnage in the North Central States east of the Mississippi River is relatively high, the coefficient being 20.99. This high variability is due in part to the general increase in the tonnage. The same is true for the North Central States west of the Mississippi River and for the Far Western States. As the tonnage in these States is estimated, the data are not so reliable as for most of the southern States, where tag sales are available.

The financial risks involved in the manufacture of commercial fertilizer are probably greatest in those regions where the tonnage is most variable. Violent decreases in tonnage cause financial losses to fertilizer companies. The margin between the cost of materials and the price of the product would tend to be greatest for those companies which operate in States where the tonnage is most variable. In the long run, profits in the good years must be sufficient to recoup the inevitable losses which occur in the

years when the tonnage is small and collections are slow due to low crop values. Profits for a single year, however, might be greatest for those companies operating in a region where sales fluctuate the most. A combination of a satisfactory margin and large sales would make profits large.

The wide differences in the variability of fertilizer tonnage in different regions probably influence the financial structure and policies of agencies operating in those regions. The companies selling goods in regions where the tonnage is relatively constant could safely carry a higher proportion of bonded debt than could those companies operating in regions where the tonnage fluctuates violently. In the latter case, a safer policy would be to have the larger part of the liabilities in the form of stocks rather than in bonds.

Factors affecting the fertilizer tonnage sold in the United States

The fertilizer tonnage fluctuates from year to year. Crop values also fluctuate from year to year. In order to determine the relationship between these fluctuations, correlations were made between the value per acre of various crops and the fertilizer tonnage.

During the fifteen-year period 1900 to 1914, there was a decided upward trend in the fertilizer tonnage and in the value of farm crops. When two series of data which have similar trends are correlated, a supposedly significant correlation may be obtained even though there is no causal relation between the two series. In order to eliminate the secular trend in the fertilizer tonnage, each year was expressed as a percentage of the preceding year. The crop values were first deflated by dividing the dollar figures by the index number of wholesale prices. This eliminated the fluctuations in the crop values due to fluctuations in the value of money. Then the values for each year were expressed as a percentage of the preceding year, to eliminate the trend. In making the correlations, fertilizer tonnage was lagged one year; that is, the December 1 value of cotton in the y year was correlated with the fertilizer tonnage in the following year, the y+1 year.

The highest correlation, $r_{12} = +0.751 \pm 0.061$, was obtained between the fertilizer tonnage and the value of cotton per acre (table 79). Approximately 50 per cent of the fertilizer tonnage is consumed in the Cotton Belt, and fertilizer is more widely used in producing cotton than any of the other major crops. When the value of cotton per acre increases, there is a tendency for the fertilizer tonnage to increase the following year; and, conversely, when the value of cotton per acre decreases, there is a tendency for the fertilizer tonnage to decline in the following year. Increasing returns from cotton production probably result in heavier applications per acre on lands already producing cotton. Furthermore, farmers plant more cotton and fertilizer is applied to more acres. The value of cotton

TABLE 79. GROSS CORRELATIONS BETWEEN FERTILIZER TONNAGE, VALUE OF CROPS PER ACRE, FERTILIZER TONNAGE ONE AND TWO YEARS PREVIOUS, AND PURCHASING POWER OF FERTILIZER MATERIALS, 1903 TO 1925*

	Fertilizer tonnage, X_1	Value of cotton per acre, X_2	Value of tobacco per acre, X_3	Value of corn per acre, X_4	Fertilizer tonnage one year previous, X_5	Fertilizer tonnage two years previous, X_6	Value of potatoes per acre, X_7	Purchasing power of fertilizer materials, X_8
Fertilizer tonnage, X_1	.....	+0.751±0.061	+0.582±0.093	+0.427±0.115	−0.084±0.140	−0.220±0.134	+0.200±0.135	−0.444±0.113
Value of cotton per acre, X_2	+0.751±0.061	.....	+0.390±0.119	+0.484±0.108	−0.291±0.129	−0.400±0.118	+0.108±0.139	−0.390±0.119
Value of tobacco per acre, X_3	+0.582±0.093	+0.390±0.119	.....	+0.531±0.101	−0.181±0.136	−0.242±0.132	+0.386±0.120	−0.526±0.102
Value of corn per acre, X_4	+0.427±0.115	+0.484±0.108	+0.531±0.101	.....	+0.133±0.138	−0.378±0.121	+0.121±0.130	−0.484±0.108
Fertilizer tonnage one year previous, X_5	−0.084±0.140	−0.291±0.129	−0.181±0.136	+0.133±0.138	.....	−0.068±0.140	−0.361±0.122	+0.209±0.134
Fertilizer tonnage two years previous, X_6	−0.220±0.134	−0.400±0.118	−0.242±0.132	−0.378±0.121	−0.068±0.140	.....	+0.093±0.139	+0.362±0.122
Value of potatoes per acre, X_7	+0.200±0.135	+0.108±0.139	+0.386±0.120	+0.121±0.130	−0.361±0.122	+0.093±0.139	.....	−0.236±0.133
Purchasing power of fertilizer materials, X_8	−0.444±0.113	−0.390±0.119	−0.526±0.102	−0.484±0.108	+0.209±0.134	+0.362±0.122	−0.236±0.133	.....

* The value per acre of each crop was expressed in 1910–1914 dollars by dividing the value per acre as reported by the United States Department of Agriculture by the wholesale price index of the United States Bureau of Labor Statistics. All data were expressed in per cent of the first preceding, or y − 1, year.

per acre is determined by the yield per acre and the price, so that the effect of both cotton prices and yield per acre on fertilizer consumption is measured in this correlation.

There is a significant correlation between the value of tobacco per acre and the fertilizer tonnage the following year ($r_{13}=+0.582\pm0.093$). Increases or decreases in the value per acre of tobacco tend to be followed by increases or decreases in the fertilizer tonnage. The correlation $r_{13}=+0.582\pm0.093$ measures the relation between the fertilizer tonnage in the United States and the value per acre of tobacco in the United States. In the various tobacco-growing regions, however, the relation might be considerably different. In the tobacco-producing States along the Atlantic seaboard, where fertilizer is commonly used in the production of this crop, the correlation would probably be much higher.

There is a significant correlation between the value of corn per acre and the fertilizer tonnage ($r_{14}=+0.427\pm0.115$), the correlation being more than 3.2 times the probable error. Relatively little fertilizer is used in growing corn. This is especially true in the corn-belt States. The value per acre of corn, however, is correlated with the value per acre of cotton ($r_{24}=+0.484\pm0.108$) and with the value per acre of tobacco ($r_{34}=+0.531\pm0.101$). The correlation between the value of corn per acre and the fertilizer tonnage may be due to the fact that corn is correlated with cotton and tobacco. The net effect of the value of corn per acre on the fertilizer tonnage can be determined only by holding the other factors constant.

The value per acre of potatoes is only slightly correlated with the fertilizer tonnage ($r_{17}=+0.200\pm0.135$). The correlation is only 1.48 times the probable error, and so the odds are only 1 to 2 that it is significant. In Aroostook County, Maine, on Long Island, in New Jersey, and on the Eastern Shore of Virginia, large amounts of fertilizer are used on potatoes. In other sections, however, little or no fertilizer is used on this crop, so that the correlation between the value per acre of potatoes in the United States and the United States fertilizer tonnage is small.

The fertilizer tonnage for one year shows no correlation with the tonnage for the preceding year ($r_{15}=-0.084\pm0.140$). This gross correlation, however, does not give the exact relation between the tonnages in consecutive years. A correlation between ratios where the same factor appears in both ratios may be a spurious correlation.[16] There is a slight negative correlation between the fertilizer tonnage one year and the tonnage two years previous.

There is a significant correlation ($r_{18}=-0.444\pm0.113$) between the purchasing power of fertilizer materials in the last six months of the year (y year) and the fertilizer tonnage the following year (y+1 year).

[16] An introduction to the theory of statistics, page 215. By G. U. Yule.

Partial and multiple correlations

The correlation of tonnage with the value of cotton per acre (r_{12}=+0.751 ±0.061) is reduced slightly when tobacco and corn are held constant ($r_{12.34}$=+0.695±0.073, table 80). Corn (X_4) and tobacco (X_3) are both

TABLE 80. PARTIAL CORRELATIONS OF FERTILIZER TONNAGE WITH THE VALUE OF CROPS PER ACRE, FERTILIZER TONNAGE ONE AND TWO YEARS PREVIOUS, AND PURCHASING POWER OF FERTILIZER MATERIALS, 1903 TO 1925*

(X_1 = fertilizer tonnage in the y year; X_2 = value of cotton per acre in the first preceding, or y − 1, year; X_3 = value of tobacco per acre in the first preceding, or y − 1, year; X_4 = value of corn per acre in the first preceding, or y − 1, year; X_5 = fertilizer tonnage in the first preceding, or y − 1, year; X_6 = fertilizer tonnage in the second preceding, or y − 2, year; X_7 = value of potatoes per acre in the first preceding, or y − 1, year; X_8 = purchasing power of the wholesale price of fertilizer materials, July to December, inclusive, in the first preceding, or y − 1, year)

Zeroo rder	1st order	2d order	3d order
r_{12}=+0.751±0.061.....	$r_{12.3}$=+0.700±0.072 $r_{12.4}$=+0.688±0.074 $r_{12.5}$=+0.762±0.059 $r_{12.6}$=+0.742±0.063 $r_{12.7}$=+0.749±0.062 $r_{12.8}$=+0.701±0.072	$r_{12.34}$=+0.695±0.073 $r_{12.35}$=+0.686±0.074 $r_{12.45}$=+0.672±0.077	$r_{12.345}$=+0.687±0.074
r_{13}=+0.582±0.093.....	$r_{13.2}$=+0.476±0.109 $r_{13.4}$=+0.464±0.110 $r_{13.5}$=+0.578±0.094 $r_{13.6}$=+0.559±0.097 $r_{13.7}$=+0.558±0.097 $r_{13.8}$=+0.457±0.111	$r_{13.24}$=+0.478±0.109 $r_{13.25}$=+0.422±0.116 $r_{13.45}$=+0.399±0.118	$r_{13.245}$=+0.438±0.114
r_{14}=+0.427±0.115.....	$r_{14.2}$=+0.110±0.139 $r_{14.3}$=+0.171±0.137 $r_{14.5}$=+0.444±0.113 $r_{14.6}$=+0.381±0.120 $r_{14.7}$=+0.414±0.116 $r_{14.8}$=+0.271±0.130	$r_{14.23}$=−0.117±0.139 $r_{14.25}$=+0.024±0.141 $r_{14.35}$=+0.121±0.139	$r_{14.235}$=−0.124±0.138
r_{15}=−0.084±0.140.....	$r_{15.2}$=+0.021±0.141 $r_{15.3}$=+0.026±0.141 $r_{15.4}$=−0.157±0.137 $r_{15.6}$=−0.102±0.139 $r_{15.7}$=−0.013±0.141 $r_{15.8}$=+0.010±0.141		
r_{16}=−0.220±0.134.....	$r_{16.2}$=+0.132±0.138 $r_{16.3}$=−0.101±0.139 $r_{16.4}$=−0.070±0.140 $r_{16.5}$=−0.228±0.133 $r_{16.7}$=−0.245±0.132 $r_{16.8}$=−0.456±0.111		
r_{17}=+0.200±0.135.....	$r_{17.2}$=+0.182±0.136 $r_{17.3}$=+0.032±0.140 $r_{17.4}$=+0.166±0.137 $r_{17.5}$=+0.183±0.136 $r_{17.6}$=+0.227±0.133 $r_{17.8}$=+0.110±0.139		
r_{18}=−0.444±0.113.....	$r_{18.2}$=−0.249±0.132 $r_{18.3}$=−0.200±0.135 $r_{18.4}$=−0.300±0.128 $r_{18.5}$=−0.438±0.114 $r_{18.6}$=−0.401±0.118 $r_{18.7}$=−0.417±0.116	$r_{18.23}$=−0.048±0.140 $r_{18.24}$=−0.226±0.133 $r_{18.36}$=−0.160±0.137	$r_{18.234}$=−0.062±0.140

* The value per acre of each crop was expressed in 1910–1914 dollars by dividing the value per acre as reported by the United States Department of Agriculture by the wholesale price index of the United States Bureau of Labor Statistics. All data were expressed in per cent of the first preceding, or y − 1, year.

TABLE 80 (*concluded*)

Zero order	1st order	2d order	3d order
$r_{23}=+0.390\pm0.119$	$r_{23.1}=-0.089\pm0.140$ $r_{23.4}=+0.179\pm0.136$ $r_{23.8}=+0.236\pm0.133$		
$r_{24}=+0.484\pm0.108$	$r_{24.1}=+0.274\pm0.130$ $r_{24.3}=+0.355\pm0.123$ $r_{24.8}=+0.366\pm0.122$		
$r_{28}=-0.390\pm0.119$	$r_{28.1}=-0.095\pm0.139$ $r_{28.3}=-0.236\pm0.133$ $r_{28.4}=-0.203\pm0.135$	$r_{23.34}=-0.151\pm0.137$	
$r_{34}=+0.531\pm0.101$	$r_{34.1}=+0.385\pm0.120$ $r_{34.2}=+0.425\pm0.115$ $r_{34.8}=+0.372\pm0.121$		
$r_{38}=-0.526\pm0.102$	$r_{38.1}=-0.367\pm0.122$ $r_{38.2}=-0.441\pm0.113$ $r_{38.4}=-0.363\pm0.122$	$r_{33.24}=-0.339\pm0.124$	
$r_{48}=-0.484\pm0.108$	$r_{48.1}=-0.363\pm0.122$ $r_{48.2}=-0.366\pm0.122$ $r_{48.3}=-0.283\pm0.129$	$r_{48.23}=-0.118\pm0.139$	

correlated with cotton, so that the gross correlation of tonnage with value of cotton measures the effect of cotton, and also some of the effect of tobacco and corn, on tonnage. When the purchasing power of fertilizer materials (X_8) is also held constant, there is practically no change in the correlation ($r_{12\cdot348}=+0.687\pm0.074$).

The gross correlation of tonnage with the value of tobacco per acre ($r_{13}=+0.582\pm0.093$) is reduced somewhat ($r_{13\cdot248}=+0.438\pm0.114$) when cotton ($X_2$), corn ($X_4$), and the purchasing power of fertilizer materials (X_8) are held constant. This is primarily due to the fact that the value of cotton and tobacco are correlated ($r_{23}=+0.390\pm0.119$). The gross correlation of tonnage with the value of tobacco per acre measures the effect of value per acre of tobacco on tonnage and also some of the effect of cotton. When the effect of cotton is eliminated the correlation is lowered.

There is no correlation between the value of corn per acre and tonnage when the effect of cotton and that of tobacco are eliminated ($r_{14\cdot23}=-0.117\pm0.139$). The gross correlation of corn and tonnage ($r_{14}=+0.427\pm0.115$) is due to the correlation of corn with cotton ($r_{24}=+0.484\pm0.108$) and that of corn with tobacco ($r_{34}=+0.531\pm0.101$).

The correlations of tonnage with value of potatoes per acre are low, even when other factors are held constant. Evidently, the changes in value of potatoes per acre have little effect on the United States tonnage.

The net effect of the purchasing power of the price of fertilizer materials on the tonnage is insignificant ($r_{18\cdot234}=-0.062\pm0.140$). The gross correla-

tion of the purchasing power of fertilizer materials with tonnage (r_{18}=−0.444±0.113) is due to the correlation of the purchasing power with the value of cotton (r_{28}=−0.390±0.119) and with the value of tobacco (r_{38}=−0.526±0.102).

During the seventeen-year period 1897 to 1913, the index numbers of the prices of fertilizer materials remained relatively constant; variation in the purchasing power was due in large part to the changes in the general price level.

TABLE 81. MULTIPLE CORRELATIONS BETWEEN FERTILIZER TONNAGE SOLD IN THE UNITED STATES, AND VARIOUS FACTORS

		Period
Fertilizer tonnage with value per acre of cotton one year, two years, three years, and four years previous	+0.738±0.061	1901–1925
Fertilizer tonnage with value per acre of cotton, tobacco, and corn one year previous	+0.782±0.052	1901–1925
Fertilizer tonnage with value per acre of cotton one year previous, and fertilizer tonnage one year and two years previous	+0.774±0.056	1903–1925
Fertilizer tonnage with value of cotton and tobacco one year previous	+0.814±0.046	1903–1925
Fertilizer tonnage with value of cotton, tobacco, corn, and potatoes one year previous, and fertilizer tonnage one and two years previous	+0.857±0.037	1903–1925
Fertilizer tonnage with value of cotton, tobacco, corn, and potatoes one year previous, fertilizer tonnage one and two years previous, and the purchasing power of fertilizer materials	+0.865±0.034	1903–1925

The correlation of fertilizer tonnage with the value per acre of cotton one year previous (r_{12}=+0.695) is significant.[17] The correlations with value per acre of cotton two years previous (r_{19}=−0.003), three years previous ($r_{1\,10}$=−0.111), and four years previous ($r_{1\,11}$=−0.045), are insignificant (table 82). The fertilizer tonnage is affected primarily by the value of cotton per acre the preceding fall; previous crops have little or no effect. Furthermore, the multiple correlation of tonnage with the value per acre of cotton for the four preceding years ($R_{1\cdot2\,9\,10\,11}$=0.738±0.061) is only 0.043 higher than the gross correlation (r_{12}=−0.695±0.069).

[17] The correlation of tonnage with the value per acre of cotton for the twenty-five years 1901 to 1925 is +0.695; for the twenty-three years 1903 to 1925 it is +0.751. Some of the multiple correlations are based on data for the twenty-five-year period and others on data for the twenty-three-year period. In order to determine the effect of the added factors on the correlation, the multiple correlation is compared with the gross correlation for the corresponding years.

TABLE 82. CORRELATIONS OF FERTILIZER TONNAGE WITH THE VALUE PER ACRE OF COTTON ONE, TWO, THREE, AND FOUR YEARS PREVIOUS, 1900 TO 1925

Fertilizer tonnage (y year) correlated with (X_1)	r
Value of cotton per acre one year previous (y–1 year) (X_2)	+0.695±0.069
Value of cotton per acre two years previous (y–2 year) (X_9)	–0.003±0.135
Value of cotton per acre three years previous (y–3 year) (X_{10})	–0.111±0.133
Value of cotton per acre four years previous (y–4 year) (X_{11})	–0.045±0.135

Multiple correlation $R_{1\cdot 2\,9\,10\,11} = 0.738 \pm 0.061$

The value of cotton per acre has no carry-over effect from one year to the next on fertilizer tonnage. This would seem to indicate that cotton farmers do not accumulate reserves in good years in order to obtain fertilizer following a year when the value per acre of cotton is low.

Fertilizer is often sold on credit in the Cotton Belt. The value per acre of cotton in the fall probably determines in a large measure the farmer's ability to make payment on his notes. It would seem that if there were a series of bad years, there would be a tendency for less credit to be extended each year and thus the effect would be cumulative; and, conversely, if there were a series of good years, more and more credit would be extended. The correlations with the value per acre of cotton for several preceding years indicate that there is no cumulative effect on the tonnage. Evidently the immediate past is the primary factor in influencing fertilizer tonnage.

The gross correlations of tonnage with the tonnage in the preceding year (X_5) and the second preceding year (X_6) are relatively insignificant ($r_{15}=-0.084\pm0.140$ and $r_{16}=-0.220\pm0.134$). The multiple correlation of tonnage with the value per acre of cotton and the tonnage in the first and second preceding years ($R_{1\cdot 256}=0.774\pm0.056$) is only 0.023 higher than the gross correlation of tonnage and value per acre of cotton ($r_{12}=+0.751\pm0.061$). The change in the fertilizer tonnage from one year to the next is affected very little, if any, by the changes in tonnage which have taken place in the two preceding years.

The multiple correlation between the value per acre of cotton and tobacco is $R_{1\cdot 23}=0.814\pm0.046$. The values per acre of these two crops are the important factors which influence the fertilizer tonnage.

The multiple correlation of tonnage with value of cotton, tobacco, corn, and potatoes one year previous, fertilizer tonnage one and two years previous, and the purchasing power of fertilizer materials, is 0.865±0.034. This is only 0.051 higher than the multiple correlation with cotton and tobacco. The value per acre of corn and potatoes, the fertilizer tonnage in the two preceding years, and the purchasing power of fertilizer materials, are of only slight importance. The multiple correlation (0.865±0.034) indicates that 75 per cent of the factors affecting the variability of the fertilizer tonnage have been measured.

The coefficient of determination, when taken without regard to sign, expresses in general the proportion of variability in the fertilizer tonnage that is due to variability in other factors. The values per acre of cotton and tobacco are the important factors that affect the fertilizer tonnage (table 83).

TABLE 83. COEFFICIENTS OF DETERMINATION

Independent variables	Per cent
Value of cotton per acre X_2	60.62
Value of tobacco per acre X_3	22.45
Value of corn per acre X_4	-9.41
Value of potatoes per acre X_7	1.02
Fertilizer tonnage one year previous X_5	-2.63
Fertilizer tonnage two years previous X_6	-4.05
Purchasing power of fertilizer materials X_8	6.80

The regression equation based on the multiple correlation 0.857 ± 0.037 is

$$X_1=0.39577X_2+0.27443X_3-0.12081X_4+0.28196X_5+0.15052X_6+0.03208X_7-1.37527$$[18]

The net regression coefficient for the value of corn per acre (X_4) is negative. When the value of corn per acre is high relative to cotton, there is probably a tendency for southern farmers to shift from cotton to corn. Less fertilizer is used on corn than on cotton, so that increases in the value per acre of corn tend to cause a decrease in the fertilizer tonnage. Increases in the value per acre of cotton (X_2), tobacco (X_3), and potatoes (X_7), and in the fertilizer tonnage for the two preceding years (X_5 and X_6), tend to be followed by increases in the fertilizer tonnage.

Using these factors, an estimate was made of the tonnage of fertilizer sold for each of the twenty-three years 1903 to 1925. These forecast tonnages were compared with the actual tonnage sold (table 84). In 1924 the forecast tonnage, 7,323,000, was 50,000 tons more than the actual tonnage, 7,273,000. The estimated tonnage was 0.7 per cent too high. In 1915 the forecast tonnage, 6,269,000, was 706,000 tons more than the actual tonnage, 5,563,000. The estimate was 12.7 per cent too high. The probable error of the forecast for the twenty-three-year period is 4.1

[18] X_1 = fertilizer tonnage expressed in per cent of the preceding year; X_2 = value of cotton per acre in the United States, deflated by the wholesale price index of the United States Bureau of Labor Statistics, expressed in per cent of the preceding year; X_3 = value of tobacco per acre in the United States, deflated by the wholesale price index of the United States Bureau of Labor Statistics, expressed in per cent of the preceding year; X_4 = value of corn per acre in the United States, deflated by the wholesale price index of the United States Bureau of Labor Statistics, expressed in per cent of the preceding year; X_5 = fertilizer tonnage sold in the United States for the preceding year, expressed in per cent of the tonnage of the second preceding year; X_6 = fertilizer tonnage sold in the United States for the second preceding year, expressed in per cent of the tonnage of the third preceding year; X_7 = value of potatoes per acre in the United States, deflated by the wholesale price index of the United States Bureau of Labor Statistics, expressed in per cent of the preceding year.

TABLE 84. ACTUAL AND FORECAST TONNAGE, 1903 TO 1925

Year	Actual tonnage	Forecast tonnage	Error of forecast	Per cent error	Per cent error squared
	(Thousands of tons)	(Thousands of tons)	(Thousands of tons)		
1903	3,075	2,983	− 92	− 3.0	9.00
1904	3,360	3,512	+152	+ 4.5	20.25
1905	3,850	3,696	−154	− 4.0	16.00
1906	4,450	4,250	−200	− 4.5	20.25
1907	4,452	4,877	+425	+ 9.5	90.25
1908	4,525	4,336	−189	− 4.2	17.64
1909	4,912	4,367	−545	−11.1	123.21
1910	5,754	5,315	−439	− 7.6	57.76
1911	6,348	6,168	−180	− 2.8	7.84
1912	5,981	6,532	+551	+ 9.2	84.64
1913	6,544	6,334	−210	− 3.2	10.24
1914	7,341	6,819	−522	− 7.1	50.41
1915	5,563	6,269	+706	+12.7	161.29
1916	5,359	5,741	+382	+ 7.1	50.41
1917	6,172	6,233	+ 61	+ 1.0	1.00
1918	6,724	6,672	− 52	− 0.8	0.64
1919	6,858	7,107	+249	+ 3.6	12.96
1920	7,609	7,832	+223	+ 2.9	8.41
1921	5,184	5,471	+287	+ 5.5	30.25
1922	5,889	5,894	+ 5	+ 0.1	0.01
1923	6,639	7,132	+493	+ 7.4	54.76
1924	7,273	7,323	+ 50	+ 0.7	0.49
1925	7,561	7,171	−390	− 5.2	27.04
Total					854.75

Σ of errors squared = 854.75
Average squared errors = 37.163
Standard deviation of error = 6.09
Probable error = 4.11

per cent. This means that for about half of the years the actual tonnage was between 96 and 104 per cent of the forecast tonnage, for about one-fourth of the years the actual tonnage was less than 96 per cent of the forecast tonnage, and for about one-fourth of the years the actual tonnage was more than 104 per cent of the forecast tonnage.

Thus the value per acre of cotton, tobacco, corn, and potatoes, and the fertilizer tonnage of the two preceding years, form a basis upon which to make a fairly accurate forecast of the fertilizer tonnage that will be consumed the following year.

The forecasting equation seems to somewhat underestimate the violent

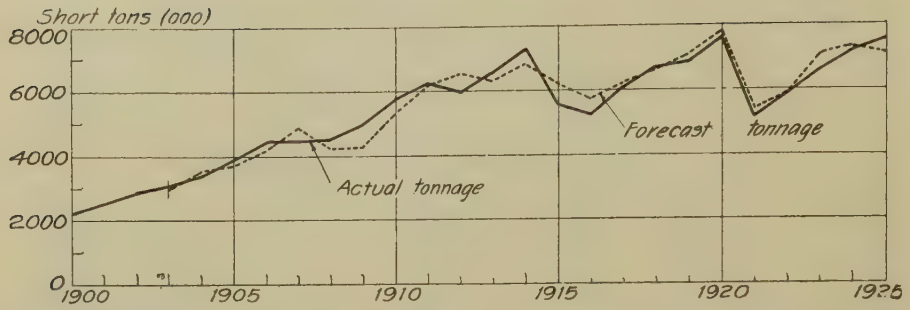

FIGURE 25. ACTUAL AND FORECAST FERTILIZER TONNAGE SOLD IN THE UNITED STATES, 1900 TO 1925

In years of violent changes the forecast tonnage did not change so much as did the actual tonnage

changes in tonnage. For instance, in 1921 there was a considerable drop in tonnage. Although a marked decline was predicted, the forecast was about 5 per cent too high.

SEASONAL VARIATION IN FERTILIZER SALES

Farmers purchase fertilizer just prior to planting time. Thus there is a distinct seasonal variation in sales. The sales of tax tags are an indication of the sales of fertilizer. The index numbers of seasonal variation in tag sales are given in table 85.

TABLE 85. INDEX NUMBERS OF SEASONAL VARIATION IN TAG SALES

State	Period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Alabama	1921–1925	106	281	557	198	9	2	1	1	2	3	10	29
Georgia	1921–1925	172	304	530	163	11	3	1	1	2	4	3	7
Georgia	1912–1916	182	338	455	160	12	7	1	0	3	12	9	20
Louisiana	1921–1925	193	372	334	112	29	6	4	5	60	69	39	57
Louisiana	1910–1914	273	267	307	120	41	10	3	7	96	29	10	39
Missouri	1921–1925	65	90	85	27	16	4	153	265	474	21	1	1
North Carolina	1921–1925	126	221	451	268	37	13	3	6	21	26	5	23
North Carolina	1910–1914	113	185	414	305	47	27	9	3	30	44	7	16
South Carolina	1921–1925	198	321	478	107	16	10	3	3	7	13	15	29
South Carolina	1910–1914	246	380	388	67	18	19	10	5	11	17	16	24
Virginia	1921–1925	173	161	200	268	58	22	31	77	123	55	4	29
Virginia	1910–1914	138	133	186	268	93	16	16	116	164	44	5	22

In Alabama, Georgia, North Carolina, and South Carolina, the peak of tag sales is in March. This peak is very pronounced. For the five years 1921 to 1925, the index numbers of seasonal variation for March in these States ranged from 451 to 557. For these same years the low month was July, with index numbers ranging from 1 to 3. The peak of tag sales for Virginia was one month later, April. In the pre-war period, 1910 to 1914,

the peak in Louisiana came in March; for the five years 1921 to 1925, however, the peak was in February.

The tonnage in Missouri is sold principally in the fall, the peak, 474, coming in September. There is also a fall tonnage, although of less importance than the spring tonnage, in Virginia, North Carolina, and Louisiana.

A comparison of the index numbers of seasonal variation for the pre-war period and for the five years 1921 to 1925, shows a tendency for the seasonal variation to be more violent in the post-war period. This would seem to indicate that there is less tendency to purchase fertilizer in anticipation of needs than before the war. With the agricultural depression there has been a tendency to delay buying.

Changes in seasonal sales of tax tags in South Carolina

In South Carolina most of the tax tags are sold during the months of January, February, and March (figure 26). For the thirty-one years

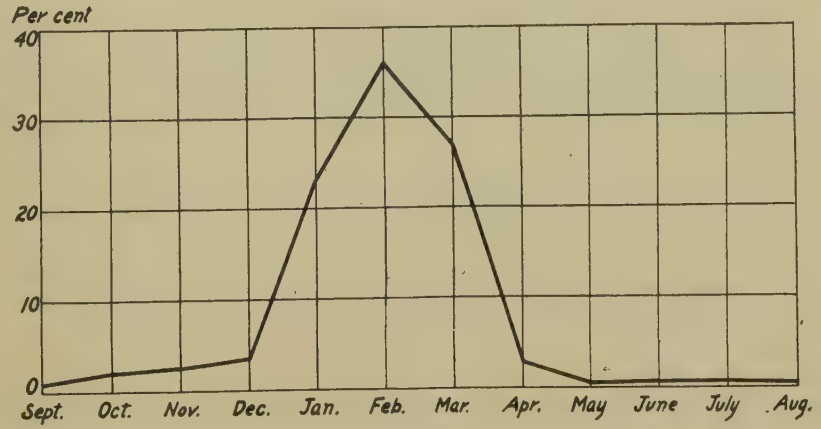

FIGURE 26. PERCENTAGE OF FERTILIZER TAG SALES IN SOUTH CAROLINA EACH MONTH, 1896–97 TO 1924–25

The largest sales occur in January, February, and March

1894–95 to 1924–25, there was a general downward trend in the percentage of the total season's sale of tax tags sold during November, December, and January (figure 27). In some years a larger part of the sales occur in earlier months of the season than in other years. In 1919–20 the sales were large during November, December, and January. They were 40 per cent of the total season's sales. In 1921–22, however, only 11 per cent of the total sales were in these three months.

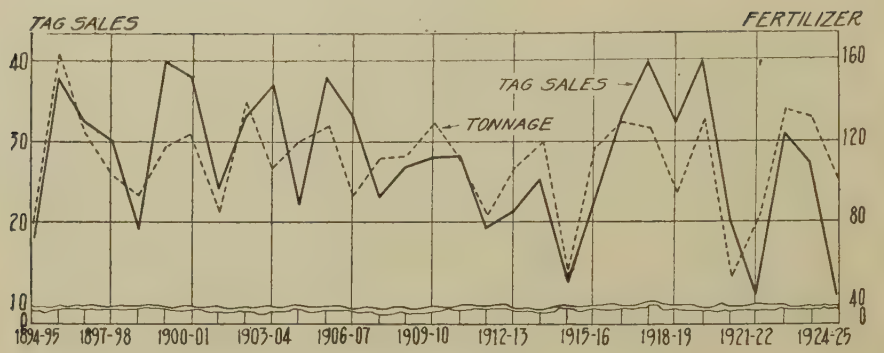

FIGURE 27. FERTILIZER TONNAGE AND TAG SALES IN SOUTH CAROLINA IN NOVEMBER, DECEMBER, AND JANUARY, 1894–95 TO 1924–25

(Fertilizer tonnage in percentage of that of the preceding year; tag sales in percentage of tags sold in November, December, and January)
When the fertilizer tonnage increases, there is a tendency to purchase fertilizer early in the season. Conversely, when the tonnage decreases there is a tendency to delay purchases

The relationship between the fertilizer tonnage and the percentage of the tax-tag sales in different seasons of the year is shown in table 86. Appar-

TABLE 86. FERTILIZER TONNAGE AND PER CENT OF SEASON'S TAG SALES FOR THE THREE MONTHS, NOVEMBER, DECEMBER, AND JANUARY, AND FOR THE THREE MONTHS, FEBRUARY, MARCH, AND APRIL, FOR SOUTH CAROLINA, 1894–95 TO 1924–25

Fertilizer tonnage in per cent of the preceding year's tonnage	Per cent of total tag sales in November, December, and January	Per cent of total tag sales in February, March, and April
80	19.7	74.8
115	29.6	65.0
134	33.5	59.9

ently, when the fertilizer tonnage is 34 per cent greater than that for the preceding year, one-third of the tax tags are purchased during November, December, and January. When the fertilizer tonnage is 80 per cent of that of the preceding year, only one-fifth of the tax tags are purchased during these three months, and about 75 per cent during the following three months, February, March, and April.

After studying various factors it was found that 57.5 per cent[19] of the

[19] $R_{1.2345}=0.758\pm0.051$.

factors influencing the time of purchasing tax tags were the fertilizer tonnage for the same year, and the fertilizer tonnage for the first, second, and third preceding years. The equation[20] for predicting the percentage of tag sales during November, December, and January is

$$X_1=0.24665X_2+0.12362X_3+0.01152X_4+0.07541X_5-21.94167$$

This equation indicates that when the fertilizer tonnage for any year is less than that for the preceding year, there is a tendency for the sales of tax tags to be delayed until late in the season. It indicates also that when there is a decrease in the fertilizer tonnage each year for several consecutive years, there is a still greater tendency for the purchase of tax tags to be delayed until late in the season.

The forecast percentages of sales during November, December, and January are shown in table 87. In some years the forecast was fairly accurate, but in other years there was a considerable error. The largest error, 16, occurred in 1924–25. The probable error of the forecast for the thirty-one years was 3.8 per cent.

[20] X_1 = per cent of the total year's fertilizer tax tags sold during the three months, November, December, and January; X_2 = fertilizer tonnage of South Carolina for the same year, expressed in per cent of the tonnage of the first preceding year; X_3 = fertilizer tonnage of South Carolina for the first preceding year expressed in per cent of the tonnage of the second preceding year; X_4 = fertilizer tonnage of South Carolina for the second preceding year expressed in per cent of the tonnage of the third preceding year; X_5 = fertilizer tonnage of South Carolina for the third preceding year expressed in per cent of tonnage of the fourth preceding year.

TABLE 87. ACTUAL AND FORECAST PERCENTAGE OF TAX TAGS SOLD DURING NOVEMBER, DECEMBER, AND JANUARY, FOR SOUTH CAROLINA, 1894–95 TO 1924–25

Season	Actual percentage of tax tags sold during November, December, and January	Forecast percentage of tax tags sold during November, December, and January	Error of forecast	Error squared
1894–95	17	12	− 5	25
1895–96	38	38	0	0
1896–97	32	36	+ 4	16
1897–98	30	26	− 4	16
1898–99	19	28	+ 9	81
1899–1900	40	29	−11	121
1900–01	38	32	− 6	36
1901–02	24	23	− 1	1
1902–03	33	33	0	0
1903–04	37	31	− 6	36
1904–05	22	29	+ 7	49
1905–06	38	36	− 2	4
1906–07	33	26	− 7	49
1907–08	23	27	+ 4	16
1908–09	27	30	+ 3	9
1909–10	28	32	+ 4	16
1910–11	28	30	+ 2	4
1911–12	19	22	+ 3	9
1912–13	21	25	+ 4	16
1913–14	25	29	+ 4	16
1914–15	12	13	+ 1	1
1915–16	22	22	0	0
1916–17	33	33	0	0
1917–18	40	30	−10	100
1918–19	32	26	− 4	16
1919–20	40	32	− 8	64
1920–21	20	17	− 3	9
1921–22	11	12	+ 1	1
1922–23	31	31	0	0
1923–24	27	31	+ 4	16
1924–25	10	26	+16	256
Total				983

Σ of errors squared	= 983
Average squared errors	= 31.71
Standard deviation of error	= 5.6
Probable error	= 3.8

STATISTICAL APPENDIX

TABLE 88. MARKETED PRODUCTION OF SOUTH CAROLINA PHOSPHATE ROCK, 1867 TO 1925*

Year	Land rock			River rock			Total		
	Long tons	Value at mines	Value per ton	Long tons	Value at mines	Value per ton	Long tons	Value at at mines	Value per ton
1867	6	.....	.....	.....	.....	.....	6	.....	.....
1868	12,262	.....	.....	.....	.....	.....	12,262	.....	.....
1869	31,958	.....	.....	.....	.....	.....	31,958	.....	.....
1870	63,252	.....	.....	1,989	.....	.....	65,241	.....	.....
1871	56,533	.....	.....	17,655	.....	.....	74,188	.....	.....
1872	36,258	.....	.....	22,502	.....	.....	58,760	.....	.....
1873	33,426	.....	.....	45,777	.....	.....	79,203	.....	.....
1874	51,624	.....	.....	57,716	.....	.....	109,340	.....	.....
1875	54,821	.....	.....	67,969	.....	.....	122,790	.....	.....
1876	50,566	.....	.....	81,912	.....	.....	132,478	.....	.....
1877	36,431	.....	.....	126,569	.....	.....	163,000	.....	.....
1878	112,622	.....	.....	97,700	.....	.....	210,322	.....	.....
1879	100,779	.....	.....	98,586	.....	.....	199,365	.....	.....
1880	125,601	.....	.....	65,162	.....	.....	190,763	.....	.....
1881	142,193	.....	.....	124,541	.....	.....	266,734	$1,980,259	$7.42
1882	191,305	.....	.....	140,772	.....	.....	332,077	1,992,462	6.00
1883	219,202	.....	.....	159,178	.....	.....	378,380	2,270,280	6.00
1884	250,297	.....	.....	181,482	.....	.....	431,779	2,374,784	5.50
1885	225,913	.....	.....	169,490	.....	.....	395,403	2,339,468	5.92
1886	253,484	.....	.....	177,065	.....	.....	430,549	1,848,939	4.29
1887	261,658	.....	.....	218,900	.....	.....	480,558	1,836,818	3.82
1888	290,689	.....	.....	157,878	.....	.....	484,567	2,018,552	4.50
1889	329,543	.....	.....	212,102	.....	.....	541,645	2,892,276	5.34
1890	353,757	.....	.....	110,241	.....	.....	463,998	2,875,605	6.20
1891	344,978	$2,187,160	$6.34	130,528	$760,978	$5.83	475,506	2,948,138	6.20
1892	243,653	1,236,447	5.07	150,575	641,262	4.26	394,228	1,877,709	4.76
1893	308,435	1,408,785	4.57	194,129	748,229	3.85	502,564	2,157,014	4.29
1894	307,305	1,252,768	4.08	142,803	492,808	3.45	450,108	1,745,576	3.88

1895	270,560	898,787	3.32	161,415	512,245	3.17	431,975	1,411,032	3.27
1896	267,072	792,457	2.97	135,351	389,192	2.88	402,423	1,181,649	2.94
1897	267,380	748,050	2.80	90,900	238,522	2.62	358,280	986,572	2.75
1898	298,610	856,225	2.87	101,274	251,047	2.48	399,884	1,107,272	2.77
1899	223,949	738,969	3.30	132,701	339,130	2.56	356,650	1,078,099	3.02
1900	266,186	877,405	3.30	62,978	164,565	2.61	329,173	1,041,970	3.17
1901	225,189	716,101	3.18	95,992	245,739	2.56	321,181	961,840	2.99
1902	245,243	753,220	3.07	68,122	166,505	2.44	313,365	919,725	2.93
1903	233,540	721,303	3.09	25,000	62,500	2.50	258,540	783,803	3.03
1904	258,806	830,117	3.21	12,000	31,200	2.60	270,806	861,317	3.18
1905	234,676	774,447	3.30	35,549	103,722	2.92	270,225	878,169	3.25
1906	190,180	711,447	3.74	33,495	105,621	3.15	223,675	817,068	3.65
1907	228,354	883,965	3.87	28,867	96,902	3.36	257,221	980,867	3.81
1908	192,263	854,837	4.45	33,232	135,044	4.06	225,495	989,881	4.39
1909	201,254	888,611	4.42	6,700	21,975	3.28	207,954	910,586	4.38
1910	179,659	733,057	4.08	.....	.....	.....	179,659	733,057	4.08
1911	169,156	673,156	3.98	.....	.....	.....	169,156	673,156	3.98
1912	131,490	524,760	3.99	.....	.....	.....	131,490	524,760	3.99
1913	109,333	440,588	4.03	.....	.....	.....	109,333	440,588	4.03
1914	106,919	415,039	3.88	.....	.....	.....	106,919	415,039	3.88
1915	83,460	310,850	3.72	.....	.....	.....	83,460	310,850	3.72
1916	53,047	211,125	3.98	.....	.....	.....	53,047	211,125	3.98
1917	33,485	138,482	4.14	.....	.....	.....	33,485	138,482	4.14
1918	37,040	164,650	4.45	.....	.....	.....	37,040	164,650	4.45
1919	60,823	308,968	5.08	.....	.....	.....	60,823	308,968	5.08
1920	.....	.....	.....	.....	.....	.....	44,144	367,209	8.32
1921	.....	.....	.....	.....	.....	.....	.....	.....	.....
1922	.....	.....	.....	.....	.....	.....	1,500	8,250	5.50
1923	.....	.....	.....	.....	.....	.....	.....	.....	.....
1924	.....	.....	.....	.....	.....	.....	.....	.....	.....
1925	2,147	8,051	3.75	.....	.....	.....	2,147	8,051	3.75

* Data from annual reports of the United States Geological Survey, *Mineral Resources of the United States*. For 1867 to 1885, production is for the year ending May 31; for 1886 to 1922, production is for the calendar year.

TABLE 89. MARKETED PRODUCTION OF FLORIDA PHOSPHATE ROCK, 1888 TO 1926*

Year	Hard rock			Land pebble			Soft rock			River pebble			Total		
	Long tons	Value at mines	Value per ton	Long tons	Value at mines	Value per ton	Long tons	Value at mines	Value per ton	Long tons	Value at mines	Value per ton	Long tons	Value at mines	Value per ton
1888													3,000	$ 21,000	$7.00
1889													4,100	28,000	6.83
1890													46,501	338,190	7.27
1891	†57,982			†			†			54,500			112,482	703,013	6.25
1892	155,908	$ 859,276	$ 5.51	21,905	$ 111,271	$5.08	6,710	$ 32,418	$ 4.83	102,820	$415,453	$4.04	287,343	1,418,418	4.94
1893	215,685	1,117,732	5.18	86,624	359,127	4.15	13,675	64,626	4.73	122,820	437,571	3.56	438,804	1,979,056	4.51
1894	326,461	979,383	3.00	98,885	296,655	3.00				102,307	390,775	3.82	527,653	1,666,813	3.16
1895	307,098	1,302,096	4.24	181,011	593,716	3.28	6,916	32,000	4.63	73,036	185,090	2.53	568,061	2,112,902	3.72
1896	296,811	1,067,525	3.60	97,936	176,972	1.81	400	2,300	5.75	100,052	300,556	3.00	495,199	1,547,353	3.12
1897	360,147	1,063,713	2.95	92,132	180,794	1.96	2,300	4,600	2.00	97,763	244,408	2.50	552,342	1,493,515	2.70
1898	366,810	1,396,108	3.81	155,084	295,688	1.89				79,000	158,000	2.00	600,894	1,847,796	3.08
1899	460,297	2,119,130	4.60	177,170	515,458	2.91				88,953	169,473	1.91	726,420	2,804,061	3.86
1900	424,977	2,229,373	5.25	221,403	612,703	2.77				59,863	141,236	2.36	706,243	2,983,312	4.22
1901	457,568	2,393,080	5.23	247,454	660,702	2.67				46,974	105,691	2.25	751,996	3,159,473	4.20
1902	429,384	1,743,694	4.06	350,991	810,792	2.31				5,055	9,711	1.92	785,430	2,564,197	3.26
1903	412,876	1,988,243	4.82	390,882	885,425	2.27				56,578	113,156	2.00	860,336	2,986,824	3.47
1904	531,087	2,672,184	5.03	460,834	1,102,993	2.39				81,030	199,127	2.46	1,072,951	3,974,304	3.70
1905	577,672	2,993,732	5.18	528,587	1,045,113	1.98				87,847	213,000	2.42	1,194,106	4,251,845	3.56
1906	587,598	3,440,276	5.85	675,444	2,029,202	3.00				41,463	116,100	2.80	1,304,505	5,585,578	4.28
1907	646,156	4,065,375	6.29	675,024	2,376,261	3.52				36,185	136,121	3.76	1,357,365	6,577,757	4.85
1908	595,743	4,566,018	7.66	1,085,199	3,885,041	3.58				11,160	33,480	3.00	1,692,102	8,484,539	5.01
1909	513,585	4,026,333	7.84	1,266,117	4,514,968	3.57							1,779,702	8,541,301	4.80
1910	438,347	3,051,827	6.96	1,629,160	5,595,947	3.43							2,067,507	8,647,774	4.18
1911	443,511	2,761,449	6.23	‡1,992,737	6,712,189	3.37							2,436,248	9,473,638	3.89
1912	493,481	3,293,158	6.67	‡1,913,418	6,168,129	3.22							2,406,899	9,461,297	3.93
1913	489,794	2,987,274	6.10	2,055,482	6,575,810	3.20							2,545,276	9,563,084	3.76
1914	309,689	1,912,197	6.17	1,829,202	5,442,547	2.98							2,138,891	7,354,744	3.44
1915	50,130	265,738	5.30	1,308,481	3,496,501	2.67							1,358,611	3,762,239	2.77
1916	§47,087	295,755	6.28	1,468,758	3,874,410	2.64	§						1,515,845	4,170,165	2.75
1917	§18,608	159,366	8.56	2,003,991	5,305,127	2.65	§						2,022,599	5,464,493	2.70
1918	62,052	377,075	6.08	1,996,847	5,565,928	2.79	8,331	147,103	17.66				2,067,230	6,090,106	2.95
1919	285,467	2,452,563	8.59	1,360,235	5,149,048	3.79	14,498	196,318	13.54				1,660,200	7,797,929	4.70
1920	400,249	4,525,191	11.31	2,955,182	14,748,620	4.99	13,953	190,551	13.66				3,369,384	19,464,362	5.78
1921	175,774	1,806,671	10.28	1,599,835	8,604,818	5.38	4,419	20,153	4.56				1,780,028	10,431,642	5.86
1922	188,084	1,308,201	6.96	1,870,063	7,035,821	3.76	446	3,500	7.85				2,058,593	8,347,522	4.05
1923	199,516	1,071,675	5.37	2,348,137	7,987,752	3.40							2,547,653	9,059,427	3.56
1924	143,115	629,579	4.40	2,289,466	7,387,897	3.23							2,432,581	8,017,476	3.30
1925	171,649	707,933	4.12	2,758,315	8,081,137	2.93							2,929,964	8,789,070	3.00
1926	116,264	465,308	4.00	2,591,943	8,218,200	3.17							2,708,207	8,683,508	3.21

* Data from annual reports of the United States Geological Survey, *Mineral Resources of the United States.*
† Hard rock, land pebble, and soft rock reported together.
‡ Includes a small quantity of river pebble.
§ Soft rock included with hard rock.

TABLE 90. MARKETED PRODUCTION OF TENNESSEE PHOSPHATE ROCK, 1894 TO 1926*

Year	Brown rock			Blue rock			Total		
	Long tons	Value at mines	Value per ton	Long tons	Value at mines	Value per ton	Long tons	Value at mines	Value per ton
1894	.....	.....	.....	.....	.....	.....	19,188	$ 67,158	$3.50
1895	.....	.....	.....	.....	.....	.....	38,515	82,160	2.13
1896	.....	.....	.....	.....	.....	.....	26,157	57,370	2.19
1897	.....	.....	.....	.....	.....	.....	128,723	193,115	1.50
1898	.....	.....	.....	.....	.....	.....	308,107	498,392	1.62
1899	.....	.....	.....	.....	.....	.....	430,192	1,192,916	2.77
1900	.....	.....	.....	.....	.....	.....	454,491	1,328,707	2.92
1901	.....	.....	.....	.....	.....	.....	409,653	1,192,090	2.91
1902	.....	.....	.....	.....	.....	.....	390,799	1,206,647	3.09
1903	.....	.....	.....	.....	.....	.....	460,530	1,543,567	3.35
1904	.....	.....	.....	.....	.....	.....	530,571	1,745,054	3.29
1905	438,139	$1,509,748	$3.45	44,031	$121,486	$2.76	482,859	1,633,389	3.38
1906	510,705	2,027,917	3.97	35,669	114,997	3.22	547,677	2,147,991	3.92
1907	594,594	2,880,904	4.85	38,993	142,382	3.65	638,612	3,047,836	4.77
1908	374,114	1,572,525	4.20	79,717	299,941	3.76	455,431	1,877,221	4.12
1909	274,410	1,035,364	3.77	66,705	275,165	4.13	341,115	1,310,529	3.86
1910	329,382	1,262,279	3.83	‡68,806	241,071	3.50	398,188	1,503,350	3.78
1911	†365,068	1,450,063	3.97	‡72,302	263,954	3.65	437,370	1,714,017	3.92
1912	359,692	1,420,726	3.95	‡63,639	219,750	3.45	423,331	1,640,476	3.88
1913	§451,559	1,774,392	3.93	§	.....	.....	451,559	1,774,392	3.93
1914	§483,203	1,822,770	3.77	§	.....	.....	483,203	1,822,770	3.77
1915	‖389,759	1,327,747	3.41	.....	.....	.....	389,759	1,327,747	3.41
1916	364,108	1,357,888	3.73	47,682	152,465	3.20	411,790	1,510,353	3.67
1917	447,203	1,920,533	4.29	65,904	205,820	3.12	513,107	2,126,353	4.14
1918	§374,535	1,917,546	5.12	§	.....	.....	374,535	1,917,546	5.12
1919	475,475	3,123,565	6.57	58,550	290,951	4.97	534,025	3,414,516	6.39
1920	556,177	4,425,761	7.96	78,671	518,234	6.59	634,848	4,943,995	7.79
1921	252,543	1,666,358	6.60	25,163	146,198	5.81	277,706	1,812,556	6.53
1922	344,231	2,055,579	5.97	9,078	51,803	5.71	353,309	2,107,382	5.96
1923	427,799	2,335,262	5.46	919	5,647	6.14	428,718	2,340,909	5.46
1924	375,260	1,958,272	5.22	21,378	81,766	3.82	396,638	2,040,038	5.14
1925	477,077	2,429,059	5.09	.....	.....	.....	477,077	2,429,059	5.09
1926	464,192	2,048,272	4.41	.....	.....	.....	464,192	2,048,272	4.41

* Data from annual reports of the United States Geological Survey, *Mineral Resources of the United States.*
† Includes a small quantity from Kentucky.
‡ Includes a small quantity from Arkansas.
§ Blue rock included with brown rock.
‖ Includes sôme blue and white rock, and a very small quantity of rock from Arkansas.

TABLE 91. PHOSPHATE ROCK SOLD IN THE UNITED STATES, 1881 TO 1926*

Year	Long tons	Value at mines	Value per ton	Index number of production (1910–14 = 100)	Index number of price (1910–14 = 100)
1881	266,734	$ 1,980,259	$7.42	9	193
1882	332,077	1,992,462	6.00	11	156
1883	378,380	2,270,280	6.00	13	156
1884	431,779	2,374,784	5.50	15	143
1885	395,403	2,339,468	5.92	14	154
1886	430,549	1,848,939	4.29	15	111
1887	480,558	1,836,818	3.82	17	99
1888	451,567	2,039,552	4.52	16	117
1889	545,745	2,920,276	5.35	19	139
1890	510,499	3,213,795	6.30	18	164
1891	587,988	3,651,151	6.21	20	161
1892	681,571	3,296,127	4.84	23	126
1893	941,368	4,136,070	4.39	32	114
1894	996,949	3,479,547	3.49	34	91
1895	1,038,551	3,606,094	3.47	36	90
1896	930,779	2,803,372	3.01	32	78
1897	1,039,345	2,673,202	2.57	36	67
1898	1,308,885	3,453,460	2.64	45	69
1899	1,515,702	5,084,076	3.35	52	87
1900	1,491,216	5,359,248	3.59	51	93
1901	1,483,723	5,316,403	3.58	51	93
1902	1,490,314	4,693,444	3.15	51	82
1903	1,581,576	5,319,294	3.36	54	87
1904	1,874,428	6,580,875	3.51	65	91
1905	1,947,190	6,763,403	3.47	67	90
1906	2,080,957	8,579,437	4.12	72	107
1907	2,265,343	10,653,558	4.70	78	122
1908	2,386,138	11,399,124	4.78	82	124
1909	2,338,264	10,796,456	4.62	80	120
1910	2,654,988	10,917,000	4.11	91	107
1911	3,053,279	11,900,693	3.90	105	101
1912	2,973,332	11,675,774	3.93	102	102
1913	3,111,221	11,796,231	3.79	107	98
1914	2,734,043	9,608,041	3.51	94	91
1915	1,835,667	5,413,449	2.95	63	77
1916	1,982,385	5,896,993	2.97	68	77
1917	2,584,287	7,771,084	3.01	89	78
1918	2,490,760	8,214,463	3.30	86	86
1919	2,271,983	11,591,268	5.10	78	132
1920	4,103,982	25,079,572	6.11	141	159
1921	2,064,025	12,270,070	5.94	71	154
1922	2,417,883	10,482,846	4.34	83	113
1923	3,006,706	11,576,049	3.85	104	100
1924	2,867,789	10,252,083	3.57	99	93
1925	3,481,819	11,545,678	3.32	120	86
1926	3,209,976	11,893,800	3.71	110	96

* Data from annual reports of the United States Geological Survey, *Mineral Resources of the United States*. For 1881 to 1885, the data are for the year ending May 31; for 1886 to 1926, the data are for the calendar year.

TABLE 92. YEARLY SALES OF THE IMPORTANT GRADES OF PHOSPHATE ROCK AS PERCENTAGES OF THE TOTAL SALES, 1867 TO 1926*

Year	South Carolina		Florida		Tennessee		Year	South Carolina		Florida		Tennessee	
	Land rock	River rock	Hard rock	Land pebble	Brown rock	Blue rock		Land rock	River rock	Hard rock	Land pebble	Brown rock	Blue rock
1867	100.0	....	....	....	....	....	1897	25.7	8.8	34.6	8.9	....	....
1868	100.0	....	....	....	....	....	1898	22.8	7.7	28.0	11.8	....	....
1869	100.0	....	....	....	....	....	1899	14.8	8.8	30.3	11.7	....	....
1870	97.0	3.0	....	....	....	....	1900	17.8	4.2	28.5	14.8	....	....
1871	76.2	23.8	....	....	....	....	1901	15.2	6.5	30.9	16.6	....	....
1872	61.7	38.3	....	....	....	....	1902	16.4	4.6	28.8	23.6	....	....
1873	42.2	57.8	....	....	....	....	1903	14.8	1.6	26.1	24.7	....	....
1874	47.2	52.8	....	....	....	....	1904	13.8	0.6	28.3	24.6	....	....
1875	44.6	55.4	....	....	....	....	1905	12.1	1.8	29.7	27.2	22.5	2.3
1876	38.2	61.8	....	....	....	....	1906	9.1	1.6	28.3	32.4	24.6	1.7
1877	22.4	77.6	....	....	....	....	1907	10.1	1.3	28.5	29.8	26.3	1.7
1878	53.5	46.5	....	....	....	....	1908	8.0	1.4	25.0	45.5	15.7	3.4
1879	50.5	49.5	....	....	....	....	1909	8.6	0.3	22.0	54.1	11.7	2.9
1880	65.8	34.2	....	....	....	....	1910	6.8	....	16.5	61.4	12.4	2.6
1881	53.2	46.8	....	....	....	....	1911	5.5	....	14.5	65.3	12.0	2.4
1882	57.5	42.5	....	....	....	....	1912	4.4	....	16.6	64.3	12.1	2.2
1883	57.9	42.1	....	....	....	....	1913	3.5	....	15.8	66.1	14.5	....
1884	57.9	41.9	....	....	....	....	1914	3.9	....	11.3	66.9	17.7	....
1885	57.2	42.8	....	....	....	....	1915	4.5	....	2.7	71.2	21.2	....
1886	58.7	41.1	....	....	....	....	1916	2.7	....	2.4	74.1	18.4	2.4
1887	54.5	45.5	....	....	....	....	1917	1.3	....	0.7	77.6	17.3	2.6
1888	64.4	35.0	....	....	....	....	1918	1.5	....	2.5	80.2	15.1	....
1889	60.4	38.8	....	....	....	....	1919	2.7	....	12.5	59.9	20.9	2.6
1890	69.4	21.6	....	....	....	....	1920	....	....	9.7	72.0	13.5	1.9
1891	58.7	22.3	9.9	....	....	....	1921	....	....	8.5	77.5	12.3	1.2
1892	35.8	22.1	22.9	3.2	....	....	1922	....	....	7.8	77.3	14.2	0.4
1893	32.7	20.6	23.0	9.2	....	....	1923	....	....	6.7	78.1	14.2	0
1894	30.8	14.3	32.7	9.9	....	....	1924	....	....	5.0	79.8	13.1	0.7
1895	26.1	15.5	29.5	17.4	....	....							
1896	28.7	14.5	31.9	10.5	....	....	1925†	0.6	....	4.9	79.2	13.7	
							1926†	....	....	3.6	80.7	14.5	

* Based on data from annual reports of the United States Geological Survey, *Mineral Resources of the United States.*
† Tennessee and Kentucky combined.

TABLE 93. MONTHLY EXPORTS OF PHOSPHATE ROCK, GROUND OR UNGROUND, NOT ACIDULATED, IN LONG TONS, 1898 TO 1925*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1898	.....	.....	.....	.....	.....	.....	79,146	60,945	81,079	41,122	50,763*	42,107	.....
1899	54,216	51,423	73,453	90,527	98,635	57,097	101,199	85,089	69,120	76,453	55,392	55,186	867,790
1900	44,013	45,978	52,516	65,771	70,046	55,457	59,837	37,207	60,742	35,534	48,180	44,714	619,995
1901	43,761	55,305	69,009	64,229	62,541	43,907	60,556	108,305	68,870	71,967	47,711	33,378	729,539
1902	34,910	44,532	49,041	95,937	58,866	73,599	99,531	39,572	101,126	102,098	59,475	43,399	802,086
1903	15,315	33,475	97,047	95,321	66,024	65,120	57,896	89,077	66,514	66,344	68,028	65,098	785,259
1904	50,536	67,530	79,348	71,148	81,885	85,726	67,414	66,036	84,059	70,804	62,197	55,801	842,484
1905	45,076	59,192	101,186	94,165	89,466	84,583	69,651	78,329	106,230	64,982	72,682	69,398	934,940
1906	87,524	75,466	89,442	94,100	84,872	71,565	82,512	109,237	59,020	64,463	53,227	32,786	904,214
1907	73,943	50,588	82,771	106,583	81,048	104,805	88,553	106,013	94,091	74,844	66,450	88,523	1,018,212
1908	101,613	71,136	116,317	121,251	116,672	134,817	104,361	101,157	119,275	85,247	72,525	51,804	1,196,175
1909	40,306	72,638	123,700	89,136	106,371	101,415	81,688	98,504	107,575	76,376	71,181	51,666	1,020,550
1910	29,603	67,011	99,571	128,522	89,297	80,101	77,059	126,401	106,591	98,653	82,362	97,866	1,083,037
1911	61,376	65,096	115,547	112,720	143,519	121,150	91,050	122,274	135,902	103,855	88,467	85,621	1,246,577
1912	105,532	31,374	94,206	105,221	134,084	115,371	116,952	134,016	90,931	115,380	90,855	72,105	1,206,027
1913	69,585	71,137	88,167	101,675	154,075	167,220	149,466	131,879	161,915	98,142	97,881	73,654	1,364,796
1914	94,165	79,241	159,229	145,625	124,491	160,277	104,624	30,401	16,260	18,682	16,216	13,836	963,047
1915	1,800	2,245	9,400	5,916	20,605	28,492	42,779	46,103	43,778	25,474	11,937	14,515	253,044
1916	9,030	6,505	18,883	24,214	30,655	25,663	19,008	29,230	28,357	31,010	11,239	9,195	242,989
1917	22,214	4,205	4,322	10,108	3,375	20,794	8,474	21,122	13,446	19,665	14,613	8,075	150,413
1918	1,828	3,602	11,379	6,628	4,309	21,815	13,463	8,015	13,032	7,856	8,802	21,601	122,330
1919	32,352	9,754	11,094	9,800	13,442	9,650	23,382	44,262	35,968	33,537	56,146	64,512	343,899
1920	89,565	61,419	80,493	60,861	109,421	87,367	112,600	120,663	90,794	76,964	58,314	89,790	1,038,251
1921	86,432	62,201	51,043	58,344	48,731	170,826	62,541	38,684	75,773	37,250	89,864	45,330	827,019
1922	40,567	25,043	41,146	61,639	141,825	59,367	45,193	74,325	42,734	59,294	72,036	51,908	715,077
1923	54,156	52,618	67,525	59,331	65,586	96,526	92,023	81,125	102,404	47,703	66,887	39,020	824,904
1924	59,318	66,808	42,593	60,746	103,503	58,419	73,066	72,031	53,559	78,021	55,607	73,080	796,751
1925	45,402	60,545	62,620	50,770	101,179	78,153	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce*. July, 1898, to June, 1912, inclusive, exports of phosphate rock; July, 1912, to June, 1925, inclusive, total of hard rock and land pebble exported; after June, 1925, hard rock and land pebble reported separately.

TABLE 94. VALUE OF MONTHLY EXPORTS OF PHOSPHATE ROCK, GROUND OR UNGROUND, NOT ACIDULATED, 1898 TO 1925*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1898	.....	.....	.....	.....	.....	.....	$ 645,972	$ 367,017	$ 625,281	$301,508	$404,393	$329,585	.....
1899	$356,773	$408,970	$ 594,173	$ 727,493	$ 782,545	$ 446,181	778,389	665,665	554,201	616,255	407,719	431,738	$6,770,102
1900	362,948	451,473	441,082	627,947	620,921	418,029	474,804	284,996	453,909	318,788	400,245	362,418	5,217,560
1901	326,839	483,943	551,068	500,999	547,133	343,251	452,840	855,434	570,901	581,059	376,109	249,669	5,839,245
1902	278,747	345,027	405,087	744,926	463,410	565,386	699,553	263,917	797,407	826,205	466,412	337,295	6,193,372
1903	130,364	265,774	745,902	794,492	521,747	495,056	453,778	626,884	528,629	534,391	506,840	505,273	6,109,230
1904	352,743	546,548	613,203	591,152	619,430	638,525	524,370	500,219	693,495	548,069	502,965	390,836	6,521,555
1905	363,846	476,791	801,329	695,342	727,130	661,882	518,021	629,389	878,533	506,770	609,602	596,957	7,465,592
1906	709,608	598,562	782,870	786,320	707,155	596,196	594,986	864,456	478,603	527,069	465,831	262,289	7,373,945
1907	577,808	452,878	711,282	878,819	701,005	848,338	713,546	835,123	771,282	633,880	570,872	692,343	8,387,176
1908	795,361	559,088	931,549	947,495	891,405	1,066,017	793,416	738,748	975,108	709,793	561,645	402,024	9,371,649
1909	305,195	500,380	940,468	664,271	760,702	754,034	602,916	752,062	826,870	562,661	549,061	425,748	7,644,368
1910	222,162	483,634	785,062	957,111	648,828	638,579	581,302	942,233	854,785	714,098	642,932	763,450	8,234,276
1911	460,745	437,236	870,009	838,771	1,082,474	880,704	641,800	897,323	1,060,395	806,114	630,111	629,706	9,235,388
1912	746,877	234,581	777,356	756,930	1,018,736	783,005	856,430	959,628	727,363	899,383	676,944	556,122	8,993,355
1913	529,602	537,330	680,790	792,195	1,127,078	1,177,097	1,121,843	920,275	1,186,324	420,875	702,732	521,605	9,720,746
1914	651,248	607,184	1,151,785	1,050,166	917,020	1,087,262	125,656	189,740	109,000	106,960	87,102	83,016	6,766,139
1915	10,800	16,450	51,200	59,160	116,916	180,815	237,774	328,120	272,942	164,168	79,254	85,590	1,603,183
1916	66,411	28,754	91,779	138,624	168,828	93,763	65,990	117,633	137,245	170,979	39,560	30,460	1,150,026
1917	91,836	37,974	18,299	39,546	32,877	73,357	31,778	80,935	57,686	88,277	59,767	49,263	661,595
1918	4,999	11,640	49,601	33,822	30,552	132,436	77,325	53,834	89,954	45,374	73,138	146,502	749,177
1919	237,214	88,034	88,566	81,994	106,605	75,419	181,329	444,193	367,661	374,510	546,516	574,119	3,166,160
1920	836,260	584,127	739,966	495,367	959,569	771,901	1,148,077	1,296,117	915,220	747,709	613,193	982,765	10,090,271
1921	836,715	690,668	602,846	668,463	531,219	739,036	633,683	307,037	722,281	324,773	789,838	373,857	7,220,416
1922	334,799	188,994	368,343	499,245	1,184,185	602,620	388,168	535,444	302,185	430,837	598,318	384,628	5,817,766
1923	424,659	480,900	446,127	380,276	482,171	648,756	703,040	526,000	762,484	248,181	400,554	247,359	5,750,507
1924	331,919	480,485	244,523	319,340	708,349	344,662	477,043	420,386	322,698	608,495	362,538	403,721	5,024,159
1925	257,433	454,963	437,071	446,428	647,896	464,173	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce*. July, 1898, to June, 1912, inclusive, exports of phosphate rock; July, 1912, to June, 1925, inclusive, total of hard rock and land pebble exported; after June, 1925, hard rock and land pebble reported separately.

TABLE 95. MONTHLY IMPORTS OF SODIUM NITRATE, IN LONG TONS, 1897 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1897	8,458	3,568	6,863	2,150	14,352	3,357	8,159	13,942	6,258	11,964	11,591	4,303	94,965
1898	11,381	14,440	5,912	8,543	10,344	18,244	9,706	19,642	9,471	20,205	12,835	6,771	147,494
1899	6,406	3,292	6,914	7,651	18,491	930	19,045	18,708	21,130	17,682	20,343	5,900	146,492
1900	7,836	14,684	8,897	14,714	16,085	19,223	10,142	21,462	11,843	15,492	24,962	16,768	182,108
1901	17,597	19,704	16,822	9,532	20,863	18,422	17,617	18,869	13,092	16,729	21,563	17,844	208,654
1902	16,145	8,515	11,198	11,746	21,439	17,564	19,788	8,414	33,171	21,986	19,833	15,446	205,245
1903	17,089	18,149	28,067	27,384	12,601	30,156	22,997	11,063	41,234	20,019	17,907	26,281	272,947
1904	38,829	20,406	29,630	25,274	16,698	23,236	11,533	30,806	23,956	13,544	24,415	29,685	288,012
1905	21,098	26,510	17,138	33,841	22,691	27,012	33,888	32,503	33,285	21,968	43,339	7,958	321,231
1906	43,784	32,231	26,128	14,922	37,093	46,887	15,519	36,975	17,243	21,751	38,925	40,764	372,222
1907	36,653	20,869	12,510	23,610	48,397	28,797	30,678	72,593	14,138	28,578	27,584	20,143	364,550
1908	25,323	7,308	18,793	25,789	36,735	22,428	21,262	40,456	24,298	39,615	31,417	17,289	310,713
1909	13,180	33,344	47,338	34,714	17,439	33,142	37,456	36,929	29,259	47,697	42,816	49,179	422,493
1910	32,907	52,286	51,789	47,131	47,480	69,630	26,108	45,781	19,448	51,045	37,126	48,441	529,172
1911	61,351	78,171	48,887	36,901	46,787	46,479	38,743	27,040	42,852	33,092	24,984	59,591	544,878
1912	44,564	35,488	25,503	37,219	54,713	57,950	55,067	11,801	25,389	56,418	62,329	19,911	486,352
1913	37,119	27,541	64,694	75,715	86,976	66,176	53,726	51,742	61,142	16,145	47,709	37,177	625,862
1914	32,609	24,604	49,629	63,243	68,912	57,411	45,072	30,472	58,184	55,096	25,891	30,592	541,715
1915	18,059	30,033	21,617	111,652	57,378	93,076	105,129	118,902	113,537	22,615	32,705	47,487	772,190
1916	90,534	67,633	99,878	110,729	129,481	133,098	119,881	95,806	88,516	139,417	71,975	71,475	1,218,423
1917	117,865	129,186	68,884	112,732	95,435	150,487	119,207	159,634	25,433	180,119	138,397	145,834	1,443,213
1918	103,974	100,344	98,344	65,853	189,630	180,251	119,941	188,119	221,518	168,340	261,327	147,433	1,845,074
1919	131,906	44,817	24,347	19,422	8,088	11,421	16,629	10,835	37,853	19,945	36,140	46,056	407,459
1920	57,207	126,357	152,003	102,411	157,709	143,896	85,684	138,080	112,648	85,005	88,489	72,403	1,321,892
1921	80,279	29,532	46,201	29,810	37,778	37,847	20,791	33,045	19,646	13,250	15,629	5,365	369,173
1922	9,470	19,160	23,452	29,891	64,130	49,442	33,307	42,474	52,081	67,929	105,954	45,174	542,464
1923	109,064	86,302	121,134	98,577	107,329	27,873	58,196	56,637	51,543	56,788	30,456	87,780	891,679
1924	160,782	149,603	115,919	73,189	73,541	37,440	50,400	61,798	68,017	70,454	65,664	59,300	986,107
1925	86,858	95,109	197,359	155,163	135,169	59,016	68,791	92,082	56,764	48,587	73,892	43,018	1,111,808
1926	103,627	156,354	171,929	124,370	58,082	12,225	23,367	55,325	37,096	47,503	51,448	63,663	914,298
1927	48,258	37,474	94,151	99,280	43,578	39,683	54,867	71,904	64,753	55,154	67,091	66,546	748,782
1928	69,867	144,716	177,187	131,819	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce.*

TABLE 96. VALUE OF IMPORTS OF SODIUM NITRATE, BY MONTHS, 1897 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1897	$ 277,355	$ 118,574	$ 216,944	$ 69,682	$ 457,693	$ 105,435	$ 258,359	$ 434,400	$ 192,154	$ 300,324	$ 235,846	$ 125,127	$ 2,811,893
1898	180,447	305,766	88,191	103,575	189,209	296,352	116,472	217,455	128,852	347,264	193,505	131,152	2,298,240
1899	91,053	34,664	179,561	129,245	464,320	21,262	484,292	447,129	537,051	446,152	496,691	154,893	3,486,313
1900	208,352	397,446	242,123	387,739	438,321	496,618	258,664	548,599	407,298	428,114	639,754	482,462	4,935,520
1901	453,946	613,264	471,105	304,299	643,044	525,987	562,837	464,820	326,252	508,369	626,457	497,215	5,997,595
1902	521,580	286,522	272,657	327,083	630,630	540,939	657,381	267,119	837,908	696,704	537,023	420,659	5,996,205
1903	526,156	651 207	986,574	821,878	427,603	907,193	782,361	337,323	1,287,571	570,855	550,759	851,326	8,709,806
1904	1,244,923	652,710	919,411	805,999	526,462	719,956	429,084	934,811	751,666	477,367	875,124	986,100	9,334,613
1905	799,328	851,426	597,769	1,309,362	783,413	887,946	1,119,971	1,134,923	1,121,693	745,171	1,552,312	300,233	11,206,518
1906	1,510,877	1,156,457	980,891	450,953	1,171,308	1,810,184	613,871	1,386,886	694,133	801,919	1,654,992	1,819,822	14,115,266
1907	1,566,365	913,566	512,732	1,020,575	1,880,383	1,172,958	1,243,169	2,804,549	520,485	1,160,905	1,241,766	807,222	14,844,675
1908	1,058,054	279,926	581,909	863,835	1,211,039	773,661	752,696	1,600,667	680,036	1,791,232	1,150,888	641,359	12,385,293
1909	526,351	994,388	1,510,964	1,071,524	592,511	1,267,801	1,030,720	1,115,721	843,792	1,469,990	1,352,289	1,493,668	13,281,629
1910	961,960	1,654,449	1,663,789	1,463,262	1,496,177	1,993,309	669,020	1,590,895	650,263	1,532,896	1,253,214	1,672,094	16,601,328
1911	1,814 543	2,269,558	1,592,548	960,647	1,510,370	1,585,032	1,085,588	710,641	1,378,128	1,050,421	735,641	2,129,806	16,844,256
1912	1,294,443	1,137,110	716,945	1,216,625	1,768,445	2,216,826	1,849,771	377,755	916,241	2,251,587	2,087,798	720,558	16,554,104
1913	1,184,029	951,496	2,158,317	2,660,444	3,019,494	2,241,478	1,851,459	1,701,531	2,224,074	600,338	1,452,369	1,285,782	21,630,811
1914	1,253,625	689,164	1,551,463	1,823,283	1,885,931	1,640,467	1,246,415	876,959	1,522,241	1,439,068	661,642	707,083	15,228,671
1915	616 029	869,114	753,638	3,060,020	1,545,687	3,117,765	3,157,819	3,291,065	3,586,200	837,798	779,581	1,345,271	22,959,997
1916	3,223,869	1,914,022	2,454,219	3,396,363	3,902,528	4,240,662	3,732,803	3,146,369	2,819,957	4,431,721	2,456,150	2,411,999	38,131,962
1917	3,975,836	4,495,770	2,212 015	4,414,631	3,813,592	6 329,067	4,781,100	5,651,096	4,617,839	7,612,524	6,558,733	5,985,293	69,137,526
1918	4,915,179	4,673,443	4,477,063	3,611,875	9,046,597	8,198,393	6,445,280	9,547,733	10,890,944	7,516,545	12,641,579	8,365,685	90,360,307
1919	7,289,882	2,269,004	1,241,276	972,588	464,290	563,742	719,146	569,928	1,146,289	889,182	1,466,624	1,975,712	19,558,963
1920	2,729,193	5,537,008	6,682,029	5,128,432	7,524,398	5,646,728	4,022,712	6,895,205	6,338,935	4,202,077	4,242,974	3,871,344	63,121,035
1921	3,908,809	1,328,771	2,461,205	1,499,810	1,841,596	1,709,510	1,054,052	1,671,089	988,127	579,687	707,916	233,274	17,982,977
1922	495,193	773,511	1,315,617	1,602,633	2,995,719	2,152,350	1,746,990	1,772,195	2,790,765	3,412,738	5,148,961	1,946,051	26,152,723
1923	5,259,016	3,951,345	5,691,097	4,898,762	5,100,721	1,341,085	2,670,116	2,797,362	2,426,681	2,683,906	1,141,847	2,990,799	40,955,770
1924	7,582,552	7,602,143	5,738,841	3,801,455	3,447,027	1,764,144	2,432,202	2,858,043	2,785,818	3,248,656	3,310,275	2,577,863	47,149,019
1925	4,302,888	4,743,427	9,219,464	7,361,345	6,190,416	3,132,749	3,068,311	4,466,838	2,481,727	2,373 267	3,305,561	2,100,534	52,746,557
1926	5,106,874	7,289,016	7,304,136	6,165,923	2,844,956	505,168	1,049,534	2,831,976	1,830,231	2,348,351	2,389,581	2,696,735	42,781,386
1927	2,335,777	1,717,509	1,086,522	3,585,398	1,844,742	1,903,604	2,369,156	2,876,212	2,188,680	2,018,031	2,383,638	2,146,133	30,132,758
1928	2,573,928	5,190,079	6,437,509	4,612,271									

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce*

TABLE 97. PRICES OF AMMONIA IN CONCENTRATED TANKAGE, 14 TO 15 PER CENT AMMONIA, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), CHICAGO, 1904 TO 1928*

(Dollars per unit)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$2.69	$2.66	$2.64	$2.64	$2.62	$2.58	$2.57	$2.58	$2.62	$2.65	$2.69	$2.77	$2.64
1904	.....	.....	2.22	2.18	2.11	2.11	2.11	2.16	2.22	2.28	2.36	2.42	2.22
1905	2.42	2.32	2.25	2.22	2.22	2.22	2.20	2.18	2.18	2.18	2.18	2.18	2.23
1906	2.18	2.29	2.35	2.27	2.23	2.25	2.29	2.33	2.36	2.44	2.49	2.47	2.33
1907	2.46	2.45	2.49	2.49	2.45	2.45	2.45	2.45	2.45	2.45	2.42	2.31	2.44
1908	2.25	2.25	2.14	2.00	2.00	2.02	2.18	2.25	2.25	2.30	2.28	2.25	2.18
1909	2.25	2.25	2.37	2.14	2.12	.....	.....	2.16	2.16	2.16	2.47	2.68	2.28
1910	2.70	2.70	2.70	2.72	2.65	2.39	2.35	2.49	2.69	2.76	2.80	2.80	2.65
1911	2.82	2.81	2.78	2.70	2.70	2.70	2.70	2.68	2.65	2.69	2.70	2.59	2.71
1912	2.42	2.28	2.20	2.29	2.25	2.26	2.33	2.38	2.40	2.40	2.40	2.40	2.33
1913	2.40	2.40	2.40	2.40	2.40	2.43	2.45	2.45	2.45	2.45	2.61	3.10	2.50
1914	3.10	3.10	3.10	3.10	3.10	3.10	3.02	2.88	2.91	2.95	2.95	2.95	3.02
1915	2.95	2.95	2.95	2.95	2.80	2.18	2.19	2.20	2.20	2.20	3.08	3.10	2.65
1916	3.08	2.98	2.95	2.75	2.68	2.50	2.44	2.68	2.82	2.98	3.25	3.65	2.90
1917	3.72	4.08	4.15	4.28	4.56	5.24	5.94	6.30	6.10	5.88	5.94	6.22	5.20
1918	6.40	6.40	6.32	6.32	6.61	6.61	6.60	6.60	6.62	6.70	6.70	6.66	6.54
1919	6.25	4.94	4.65	4.56	4.62	4.42	4.59	5.55	6.35	6.12	6.22	6.25	5.38
1920	6.25	6.25	6.25	6.25	6.78	7.12	7.22	7.20	7.03	6.25	4.20	2.82	6.14
1921	2.65	2.58	2.25	2.25	2.25	1.97	1.88	1.88	2.03	2.25	2.25	2.44	2.22
1922	2.88	3.20	3.84	3.12	2.38	2.44	3.25	3.75	3.66	3.22	3.38	3.75	3.24
1923	3.92	3.75	3.63	3.10	2.75	2.69	2.62	2.62	2.84	3.88	3.88	3.52	3.27
1924	3.12	3.12	3.12	2.91	2.50	2.50	2.75	2.75	3.00	3.00	3.00	3.00	2.90
1925	3.00	3.00	3.00	3.00	3.00	2.90	3.00	3.15	3.25	3.25	3.21	3.20	3.08
1926	3.20	3.20	3.08	3.05	3.05	3.15	3.44	3.50	3.50	3.50	3.50	3.50	3.31
1927	3.50	3.50	3.50	3.50	3.34	3.06	3.50	3.65	4.00	4.00	4.00	3.80	3.61
1928	3.80	3.80	3.80	3.80	3.80	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of ammonia in concentrated tankage were obtained from the *Oil, Paint and Drug Reporter*. For the period from March, 1904, to December, 1905, the quotations were for concentrated tankage 15 to 16 per cent ammonia. From January, 1906, to September, 1908, the percentage of ammonia was not given. From October, 1908, to May, 1928, the percentage of ammonia was given as 14 to 15 per cent.

TABLE 98. INDEX NUMBERS OF PRICES OF AMMONIA IN CONCENTRATED TANKAGE, 14 TO 15 PER CENT AMMONIA, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), CHICAGO, 1904 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1904	.....	.....	84	83	81	82	82	84	85	86	88	87	84
1905	90	87	85	84	85	86	86	85	83	82	81	79	84
1906	81	86	89	86	85	87	89	90	90	92	92	89	88
1907	92	92	94	94	94	95	95	95	94	92	90	83	92
1908	84	85	81	76	76	78	85	87	86	87	85	81	83
1909	84	85	90	81	81	.....	.....	84	82	82	92	97	86
1910	100	102	102	103	101	93	91	97	103	104	104	101	100
1911	105	106	105	102	103	105	105	104	101	102	100	94	103
1912	90	86	83	87	86	88	91	92	92	91	89	87	88
1913	89	90	91	91	92	94	95	95	94	92	97	112	95
1914	115	117	118	117	118	120	118	112	111	111	110	107	114
1915	110	111	112	112	107	85	85	85	84	83	114	112	100
1916	115	112	112	104	102	97	95	104	108	112	121	132	110
1917	138	153	157	162	174	203	231	245	233	222	221	225	197
1918	238	241	240	239	252	257	257	256	253	253	249	241	248
1919	233	186	176	173	176	172	179	216	242	231	231	226	204
1920	233	235	237	237	259	276	281	280	268	236	156	102	232
1921	99	97	85	118	86	76	73	73	77	85	84	88	84
1922	107	120	146	118	91	95	126	146	140	122	126	135	123
1923	146	141	138	117	105	104	102	102	108	146	144	127	124
1924	116	117	118	110	95	97	107	107	115	113	111	108	110
1925	112	113	114	114	115	113	117	122	124	123	119	116	117
1926	119	120	117	116	116	122	134	136	134	132	130	126	125
1927	130	132	133	133	127	119	136	141	153	151	149	137	137
1928	141	143	144	144	145	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 99. PRICES OF AMMONIA IN HIGH-GRADE GROUND BLOOD, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), CHICAGO, 1904 TO 1928*

(Dollars per unit)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910 1914	$2.98	$3.00	$3.02	$2.93	$2.80	$2.74	$2.74	$2 76	$2.85	$2.95	$2.97	$3.01	$2.90
1904	2.50	2.62	2.61	2.45	2.41	2.39	2.37	2.37	2.44	2.57	2.68	2.68	2.51
1905	2.66	2.60	2.49	2.48	2.40	2.38	2.38	2.45	2.44	2.42	2.42	2.46	2.46
1906	2.49	2.66	2.68	2.54	2.44	2.43	2.41	2.41	2.41	2.47	2.62	2.70	2.52
1907	2.72	2.77	2.85	2.77	2.59	2.52	2.52	2.52	2.56	2.52	2.48	2.37	2.60
1908	2.36	2.42	2.34	2.32	2 32	2.34	2.49	2.55	2.61	2.59	2.56	2.49	2.45
1909	2 49	2.49	2.50	2.47	2.46	2.45	2.47	2.47	2.47	2.52	2.76	2.91	2.54
1910	2.94	2.94	3.05	3.21	2.90	2.70	2.71	2.80	3.01	3.16	3.20	3.16	2.98
1911	3 18	3.29	3.28	3.08	2.91	2.91	2.92	2.91	2.98	3.05	3.03	3.00	3.04
1912	2.98	2.95	2.95	2.57	2 40	2.40	2.50	2.55	2.60	2.60	2.60	2.60	2.64
1913	2.60	2 60	2.60	2.60	2.60	2.66	2.70	2.70	2.74	2.80	2.89	3.15	2.72
1914	3 18	3.20	3.20	3.20	3.18	3.05	2.88	2.85	2.92	3.15	3.15	3.15	3.09
1915	2 82	2.61	2.65	2.56	2 48	2.36	2.30	2.30	2.35	2.70	3.25	3.25	2.64
1916	3 22	3.12	3.15	3.72	2.50	2.61	2.72	2.95	3.15	3.29	3.58	3.81	3.07
1917	3 95	4.22	4.30	4.53	4.84	5.55	6.04	6.42	6.42	.....	.....	6.60	5.29
1918	6.60	6.58	6.58	6.45	6.62	6.64	6.72	6.90	6.90	7.10	7.05	6.79	6.74
1919	6.19	5.14	4.82	4.74	5.06	5.26	5.66	6.65	7.30	7.30	7.34	7.54	6.08
1920	7.62	7.62	8.56	8.70	8.30	8.16	8.22	7.98	7.62	7.16	5.40	3.56	7.41
1921	3.30	3.45	3.40	3.40	3.37	3.12	3.00	2.92	2.99	3.30	3.25	3.38	3.24
1922	3.50	3.69	4.38	4.25	3.40	3.38	4.50	4.54	4.38	4.00	4.59	4.68	4.11
1923	4 64	4.75	4.75	4.22	3.52	3.61	3.83	3.95	4.01	4.53	4.75	4.40	4.25
1924	3.57	3.50	3.61	3.02	2.82	2.89	3.21	4.22	3.98	3.78	3.72	3.66	3.50
1925	3.60	3.52	3.44	3.38	3.38	3.32	4.50	4.50	4.69	4.38	3.92	4.25	3.91
1926	4.19	4.22	3.90	3.91	3.72	4.02	4.41	4.36	3.96	3.66	4.02	4.12	4.04
1927	4.32	4.78	4.86	4.91	4.40	4.12	4.31	4.71	4.90	4.88	4.95	5.20	4.70
1928	5.18	5.12	4.92	4.50	4.94	.....	.....	.....	.....	.....	.....	.....	.....

* Prices of ammonia in high-grade ground blood were obtained from the *Oil, Paint and Drug Reporter*. For the five years 1904 to 1908, the quotations were for high-grade blood. From 1909 to 1920, the quotations did not specify the grade of blood. For the years 1921 to 1928, the quotations were for high-grade ground blood.

TABLE 100. INDEX NUMBERS OF PRICES OF AMMONIA IN HIGH-GRADE GROUND BLOOD, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), CHICAGO, 1904 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1904	84	87	87	84	86	87	86	86	86	87	90	89	87
1905	89	87	83	85	86	87	87	89	86	82	81	82	85
1906	84	89	89	87	87	89	88	87	85	84	88	90	87
1907	91	92	94	94	93	92	92	92	90	85	83	79	90
1908	79	81	78	79	83	85	91	92	92	88	86	83	85
1909	84	83	83	84	88	89	90	89	87	85	93	97	88
1910	99	98	101	109	104	98	99	101	106	107	108	105	103
1911	107	110	109	105	104	106	106	105	105	103	102	100	105
1912	100	98	98	88	86	87	91	92	91	88	87	86	91
1913	87	87	86	89	93	97	98	98	96	95	97	105	94
1914	107	107	106	109	114	111	105	103	102	107	106	105	107
1915	95	87	88	87	89	86	84	83	82	91	109	108	91
1916	108	104	104	93	89	95	99	107	111	111	120	126	106
1917	133	141	143	154	173	202	220	232	225	.....	.....	219	183
1918	222	220	218	220	237	242	245	250	242	241	237	225	233
1919	208	172	160	162	181	192	206	241	256	247	247	250	210
1920	256	254	284	297	297	297	300	289	267	243	182	118	256
1921	111	115	113	116	120	114	109	106	105	112	109	112	112
1922	118	123	145	145	122	123	164	164	154	135	154	155	142
1923	156	159	157	144	126	132	140	143	141	153	160	146	147
1924	120	117	120	103	101	105	117	153	140	128	125	122	121
1925	121	117	114	115	121	121	164	163	165	148	132	141	135
1926	141	141	129	133	133	147	161	158	139	124	135	137	139
1927	145	159	161	168	157	150	157	171	172	165	167	173	162
1928	174	171	163	154	176	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 101. PRICES OF AMMONIA IN DRIED BLOOD, 15 TO 17 PER CENT AMMONIA, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), NEW YORK CITY, 1897 TO 1928*

(Dollars per unit)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$3.08	$3.10	$3.12	$3.06	$2.94	$2.85	$2.84	$2.89	$2.98	$3.06	$3.08	$3.13	$3.01
1897	1.75	1.74	1.74	1.72	1.70	1.66	1.76	1.82	1.94	1.98	1.98	1.94	1.81
1898	1.92	1.90	1.80	1.78	1.80	1.82	1.79	1.78	1.78	1.78	1.78	1.76	1.81
1899	1.78	1.78	1.78	1.81	1.82	1.98	1.94	1.92	1.92	1.88	1.82	1.86	1.86
1900	2.20	2.51	2.46	2.47	2.29	2.09	2.08	2.26	2.24	2.31	2.36	2.32	2.30
1901	2.31	2.35	2.39	2.35	2.32	2.30	2.29	2.26	2.22	2.30	2.26	2.16	2.29
1902	2.24	2.22	2.30	2.39	2.45	2.38	2.34	2.35	2.41	2.50	2.44	2.45	2.37
1903	2.57	2.62	2.66	2.68	2.62	2.58	2.58	2.58	2.58	2.56	2.58	2.52	2.59
1904	2.51	2.54	2.54	2.58	2.56	2.52	2.52	2.52	2.52	2.60	2.62	2.62	2.55
1905	2.62	2.58	2.52	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.61
1906	2.62	2.70	2.75	2.75	2.71	2.71	2.69	2.69	2.69	2.70	2.74	2.78	2.71
1907	2.80	2.82	2.81	2.82	2.72	2.72	2.72	2.72	2.68	2.68	2.66	2.60	2.73
1908	2.48	2.48	2.52	2.48	2.48	2.43	2.52	2.58	2.65	2.62	2.62	2.62	2.54
1909	2.68	2.73	2.76	2.77	2.79	2.79	2.78	2.68	2.64	2.64	2.77	2.94	2.75
1910	3.02	3.02	3.11	3.27	3.09	2.84	2.82	2.92	3.15	3.28	3.32	3.32	3.10
1911	3.31	3.36	3.36	3.25	3.14	3.02	3.02	3.05	3.05	3.05	3.03	3.02	3.14
1912	3.02	3.02	3.02	2.66	2.40	2.40	2.50	2.61	2.74	2.75	2.75	2.75	2.72
1913	2.75	2.75	2.75	2.75	2.75	2.81	2.85	2.85	2.89	2.95	3.04	3.30	2.87
1914	3.32	3.35	3.35	3.35	3.32	3.20	3.01	3.00	3.08	3.25	3.25	3.25	3.23
1915	2.95	2.76	2.80	2.70	2.63	2.51	2.58	2.70	2.69	2.70	3.40	3.40	2.82
1916	3.37	3.20	3.15	2.90	2.65	2.76	2.85	3.18	3.30	3.46	3.85	4.02	3.22
1917	4.10	4.38	4.45	4.68	4.99	5.69	6.19	6.55	6.48	6.35	6.32	6.58	5.56
1918	6.88	6.77	6.68	6.68	6.71	6.79	6.85	6.95	7.14	7.36	7.39	6.92	6.93
1919	6.31	5.90	5.40	5.00	5.22	5.24	5.48	6.62	7.40	7.25	7.25	7.38	6.20
1920	7.68	7.92	8.75	8.44	8.07	8.00	8.06	7.92	7.62	6.88	5.02	4.44	7.40
1921	3.92	3.69	3.32	3.18	2.99	3.00	3.00	2.87	2.92	3.74	3.66	3.51	3.32
1922	3.66	3.86	4.02	3.81	3.30	3.72	4.30	4.60	4.60	4.41	4.56	4.70	4.13
1923	4.78	4.76	4.72	4.44	3.69	3.75	3.75	3.75	.....	.....	.....	.....	4.20
1924	.....	.....	3.68	3.38	3.14	3.00	3.00	3.52	3.92	3.75	3.75	3.65	3.48
1925	3.60	3.60	3.56	3.64	2.91	3.54	3.82	3.94	4.10	4.12	4.03	4.05	3.74
1926	4.10	4.25	4.04	3.74	3.48	3.51	4.02	4.00	4.00	3.92	3.86	3.81	3.89
1927	3.81	4.34	4.40	4.50	4.45	4.13	4.19	4.50	4.66	4.73	4.86	5.00	4.46
1928	4.98	5.05	5.03	5.06	4.84	.....	.....	.....	.....	.....	.....	.....	.....

*Prices of ammonia in dried blood were obtained from the *Oil, Paint and Drug Reporter*. For the years 1897 to 1903, the quotations were for red dried blood.

TABLE 102. INDEX NUMBERS OF PRICES OF AMMONIA IN DRIED BLOOD, 15 TO 17 PER CENT AMMONIA, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), NEW YORK CITY, 1897 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1897	57	56	56	56	58	58	62	63	65	65	64	62	60
1898	62	61	58	58	61	64	63	62	60	58	58	56	60
1899	58	57	57	59	62	69	68	67	64	62	59	59	62
1900	71	81	79	81	78	73	73	78	75	76	77	74	76
1901	75	76	77	77	79	81	81	78	74	75	73	69	76
1902	73	72	74	78	83	83	82	81	81	82	79	78	79
1903	83	85	85	88	89	90	91	89	87	84	84	81	86
1904	81	82	81	84	87	88	89	87	85	85	85	84	85
1905	85	83	81	86	89	92	92	91	88	86	85	84	87
1906	85	87	88	90	92	95	95	93	90	88	89	89	90
1907	91	91	90	92	93	95	96	94	90	88	86	83	91
1908	80	80	81	81	84	85	89	89	89	86	85	84	84
1909	87	88	89	91	95	98	98	93	89	86	90	94	91
1910	98	97	100	107	105	100	99	101	106	107	108	106	103
1911	107	108	108	106	107	106	106	106	102	100	98	97	104
1912	98	97	97	87	82	84	88	90	92	90	89	88	90
1913	89	89	88	90	94	98	100	99	97	97	99	105	95
1914	108	108	107	110	113	112	106	104	103	106	106	104	107
1915	96	89	90	88	89	88	91	94	90	88	110	109	94
1916	109	103	101	95	90	97	100	110	111	113	125	129	107
1917	133	141	143	153	170	199	218	227	217	208	205	210	185
1918	223	218	214	219	228	238	241	241	239	241	240	221	230
1919	205	190	173	164	178	184	193	229	248	237	236	236	206
1920	249	255	281	276	274	280	284	274	256	225	163	142	246
1921	127	119	106	104	102	105	106	99	98	122	119	112	110
1922	119	125	129	125	112	130	151	159	154	144	148	150	137
1923	155	154	151	145	126	131	132	130	.....	.....	.....	.....	140
1924	.....	.....	118	111	107	105	106	122	131	123	122	117	116
1925	117	116	114	119	99	124	135	137	137	135	131	129	124
1926	133	137	129	122	118	123	142	138	134	128	125	122	129
1927	124	140	141	147	151	145	147	156	156	155	158	160	148
1928	162	163	161	165	165	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 103. PRICES OF AMMONIA IN FISH SCRAP, WET ACIDULATED, 6 PER CENT AMMONIA AND 3 PER CENT BONE PHOSPHATE, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), F. O. B. WORKS, 1903 TO 1928*

(Dollars per unit)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1910–1914	$2.51	$2.51	$2.53	$2.40	$2.39	$2.37	$2.54	$2.52	$2.54	$2.57	$2.61	$2.59	$2.51
1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.22	2.18	.....
1904	2.24	2.30	2.25	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.22
1905	2.20	2.20	2.20	2.20	2.20	2.20	2.21	2.25	2.25	2.27	2.32	2.35	2.24
1906	2.38	2.40	2.35	2.25	2.40	2.30	2.30	2.30	2.30	2.30	2.30	2.36	2.33
1907	2.40	2.40	2.40	2.40	.....	2.75	2.75	.....	2.60	2.60	2.60	2.60	2.55
1908	2.60	2.60	2.14	1.80	1.80	1.83	2.46	2.50	2.50	2.48	2.40	2.40	2.29
1909	2.38	2.22	2.20	2.20	2.20	2.26	2.33	2.16	2.10	2.08	2.14	2.34	2.22
1910	2.33	2.33	2.39	2.19	2.22	2.12	2.23	2.28	2.38	2.57	2.65	2.58	2.36
1911	.....	.....	.....	.....	2.35	.....	2.89	2.85	2.78	2.73	2.70	2.70	2.71
1912	2.70	2.70	2.70	2.50	2.50	2.50	2.50	2.45	2.40	2.40	2.48	2.50	2.53
1913	2.50	2.50	2.50	2.50	2.50	2.50	.....	2.52	2.60	.....	.....	.....	2.52
1914	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1915	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1916	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1917	4.25	4.25	4.25	4.25	4.25	4.25	4.65	6.25	6.06	6.00	6.00	4.25	3.97
1918	.....	.....	.....	6.25	6.25	6.25	6.75	7.25	7.10	7.00	7.00	7.00	4.95
1919	7.00	.....	.....	5.75	5.62	5.50	5.00	5.12	5.55	5.50	5.50	5.50	6.76
1920	5.50	5.50	.....	.....	6.25	6.50	6.50	6.90	6.25	5.50	4.84	4.12	5.60
1921	4.00	.....	.....	.....	.....	.....	.....	2.25	2.25	2.65	2.62	2.38	5.79
1922	2.50	2.50	.....	.....	2.75	2.68	3.10	2.81	2.94	3.00	3.19	3.76	2.69
1923	3.85	3.85	3.95	3.88	3.58	3.50	3.15	2.75	2.76	2.99	3.84	3.95	2.92
1924	3.96	4.00	.....	.....	.....	2.85	3.00	3.38	3.88	3.88	3.88	3.88	3.50
1925	3.88	3.88	3.88	3.88	3.69	3.55	3.86	3.90	4.00	4.00	4.00	4.00	3.63
1926	4.00	4.00	.....	3.50	3.50	3.50	3.50	3.50	3.12	3.00	3.00	3.00	3.88
1927	3.00	.....	.....	.....	3.50	3.31	3.50	3.50	3.68	3.85	3.92	4.00	3.42
1928	4.00	4.00	4.00	4.00	4.50	.....	.....	.....	.....	.....	.....	.....	3.58

* Prices of ammonia in fish scrap were obtained from the *Oil, Paint and Drug Reporter*. From November, 1903, to May, 1906, the percentage of bone phosphate was not given.

TABLE 104. INDEX NUMBERS OF PRICES OF AMMONIA IN FISH SCRAP, WET ACIDULATED, 6 PER CENT AMMONIA AND 3 PER CENT BONE PHOSPHATE, IN BULK, PER UNIT (20 POUNDS OF AMMONIA), F. O. B. WORKS, 1903 TO 1928

(Corresponding months 1910–1914 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85	84	.....
1904	89	92	89	92	92	93	87	87	87	86	84	85	88
1905	88	88	87	92	92	93	87	89	89	88	89	91	89
1906	95	96	93	94	100	97	91	91	91	90	88	91	93
1907	96	96	95	100	.....	116	108	.....	102	101	100	100	102
1908	104	104	85	75	75	77	97	99	98	97	92	93	91
1909	95	88	87	92	92	95	92	86	83	81	82	90	88
1910	93	93	94	91	93	89	88	90	94	100	102	99	94
1911	.....	.....	.....	.....	98	.....	114	113	109	106	103	104	108
1912	108	108	107	104	105	105	98	97	94	93	95	96	101
1913	100	100	99	104	105	105	.....	100	102	.....	.....	.....	101
1914	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1915	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1916	.....	.....	.....	.....	.....	.....	.....	.....	.....	142	154	164	158
1917	169	169	168	177	178	179	183	248	239	234	230	.....	198
1918	.....	.....	.....	260	262	264	266	287	280	273	268	270	270
1919	279	.....	.....	240	235	232	197	203	219	214	211	212	223
1920	219	219	.....	.....	262	274	256	273	246	214	185	159	231
1921	159	.....	.....	.....	.....	.....	.....	89	89	103	100	92	107
1922	100	100	.....	.....	115	113	122	111	116	117	122	145	117
1923	153	153	156	162	150	148	124	109	109	116	147	152	140
1924	158	159	.....	.....	.....	120	118	134	153	151	149	150	145
1925	155	155	153	162	154	150	152	154	157	156	153	154	155
1926	159	159	.....	146	146	148	138	139	123	117	115	116	136
1927	120	.....	.....	.....	146	140	138	139	145	150	150	154	143
1928	159	159	158	167	188	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 105. SALES OF PURE POTASH (K_2O), IN THOUSANDS OF DOUBLE ZENTNERS (= 220 POUNDS), 1880 TO 1924*

Year	Kainit	Manure salts			Muriate, 80 per cent	Sulfate, 90 per cent	Sulfate of potash magnesia, 48 per cent	Total
		20 per cent	30 per cent	40 per cent				
1880	158	12	4	.....	490	...	18	686
1881	173	13	4	.....	583	...	23	803
1882	156	18	6	.....	773	...	31	993
1883	250	15	5	.....	688	...	26	999
1884	.....	.....	....	.....	.....	...	..	.....
1885	241	12	4	.....	528	19	23	846
1886	212	10	5	.....	557	18	26	849
1887	215	10	4	.....	657	51	16	983
1888	307	17	8	.....	667	53	30	1,111
1889	311	23	6	.....	665	36	24	1,123
1890	365	24	5	.....	681	67	28	1,223
1891	498	19	9	.....	725	92	30	1,433
1892	602	22	6	.....	611	75	31	1,415
1893	742	21	7	2	669	80	33	1,640
1894	802	23	8	5	747	74	33	1,792
1895	751	25	7	4	732	65	21	1,697
1896	963	21	7	11	787	67	12	1,973
1897	1,156	25	7	15	802	75	19	2,218
1898	1,266	24	9	18	881	86	27	2,441
1899	1,262	58	19	128	912	120	22	2,618
1900	1,355	122	25	222	1,043	152	31	3,036
1901	1,669	143	28	240	1,068	137	30	3,431
1902	1,605	118	32	249	965	147	44	3,289
1903	1,814	154	39	255	1,043	187	58	3,664
1904	2,159	172	45	325	1,190	191	72	4,301
1905	2,486	146	69	394	1,288	206	79	4,833
1906	2,733	204	78	495	1,412	249	96	5,474
1907	2,717	169	92	563	1,473	274	82	5,578
1908	2,941	145	109	706	1,459	266	88	5,916
1909	3,191	165	121	917	1,657	344	98	6,753
1910	3,739	282	165	1,195	2,196	454	108	8,579
1911	4,057	341	175	1,549	2,242	536	127	9,399
1912	4,157	351	197	1,973	2,384	563	145	10,092
1913	4,496	481	193	2,460	2,449	539	151	11,104
1914	3,296	337	145	2,611	1,837	370	142	9,040
1915	2,489	159	66	2,881	680	26	201	6,798
1916	2,777	611	164	4,200	575	14	108	8,840
1917	3,398	1,741	206	2,592	1,491	270	125	10,043
1918	3,906	1,810	53	952	2,925	69	63	10,017
1919	3,728	1,262	79	730	2,164	91	16	8,120
1920	3,484	1,514	115	1,106	2,743	173	69	9,236
1921	2,729	698	272	3,254	1,982	216	34	9,211
1922	2,980	996	509	5,066	2,727	511	144	12,955
1923	1,671	701	466	3,587	1,680	632	110	8,859
1924	1,745	860	269	3,454	1,375	563	142	8,421

* Data from *Kali Handbook*, 1925, pages 512–513, Commerce and Private Bank, Magdeburg, Germany

TABLE 106. PERCENTAGE OF PURE POTASH (K_2O) FROM EACH SALT, 1880 TO 1924*

Year	Kainit	Manure salts			Muriate	Sulfate	Sulfate of potash magnesia
		20 per cent	30 per cent	40 per cent			
1880	23.0	2.0	0.6	....	71.0	....	3.0
1881	22.0	2.0	0.5	....	73.0	....	3.0
1882	16.0	2.0	0.6	....	78.0	....	3.0
1883	25.0	2.0	0.5	....	69.0	....	3.0
1884	....	....	....	....	....	....	....
1885	28.0	1.0	0.5	....	62.0	2.0	3.0
1886	25.0	1.0	0.6	....	66.0	2.0	3.0
1887	22.0	1.0	0.4	....	67.0	5.0	2.0
1888	28.0	2.0	0.7	....	60.0	5.0	3.0
1889	28.0	2.0	0.5	....	59.0	3.0	2.0
1890	30.0	2.0	0.4	....	56.0	5.0	2.0
1891	35.0	1.0	0.6	....	51.0	6.0	2.0
1892	43.0	2.0	0.4	....	43.0	5.0	2.0
1893	45.0	1.0	0.4	0.1	41.0	5.0	2.0
1894	45.0	1.0	0.4	0.3	42.0	4.0	2.0
1895	44.0	1.0	0.4	0.2	43.0	4.0	1.0
1896	49.0	1.0	0.4	0.6	40.0	3.0	0.6
1897	52.0	1.0	0.3	0.7	36.0	3.0	0.9
1898	52.0	1.0	0.4	0.7	32.0	4.0	1.0
1899	48.0	2.0	0.7	5.0	35.0	5.0	0.8
1900	45.0	4.0	0.8	7.0	34.0	5.0	1.0
1901	49.0	4.0	0.8	7.0	31.0	4.0	0.9
1902	49.0	4.0	1.0	8.0	29.0	4.0	1.0
1903	50.0	4.0	1.0	7.0	28.0	5.0	2.0
1904	50.0	4.0	1.0	8.0	28.0	4.0	2.0
1905	51.0	3.0	1.0	8.0	27.0	4.0	2.0
1906	50.0	4.0	1.0	9.0	26.0	5.0	2.0
1907	49.0	3.0	2.0	10.0	26.0	5.0	1.0
1908	50.0	2.0	2.0	12.0	25.0	4.0	1.0
1909	47.0	2.0	2.0	14.0	25.0	5.0	1.0
1910	44.0	3.0	2.0	14.0	26.0	5.0	1.0
1911	43.0	4.0	2.0	16.0	24.0	6.0	1.0
1912	41.0	3.0	2.0	20.0	24.0	6.0	1.0
1913	40.0	4.0	2.0	22.0	22.0	5.0	1.0
1914	36.0	4.0	2.0	29.0	20.0	4.0	2.0
1915	37.0	2.0	1.0	42.0	10.0	0.4	3.0
1916	31.0	7.0	2.0	48.0	7.0	0.2	1.0
1917	34.0	17.0	2.0	26.0	15.0	3.0	1.0
1918	39.0	18.0	0.5	10.0	29.0	0.7	0.6
1919	46.0	16.0	1.0	9.0	27.0	1.0	0.2
1920	38.0	16.0	1.0	12.0	30.0	2.0	0.7
1921	30.0	8.0	3.0	35.0	22.0	2.0	0.4
1922	23.0	8.0	4.0	39.0	21.0	4.0	1.0
1923	19.0	8.0	5.0	40.0	19.0	7.0	1.0
1924	21.0	10.0	3.0	41.0	16.0	7.0	2.0

* Data from *Kali Handbook*, 1925, pages 512–513, Commerce and Private Bank, Magdeburg, Germany.

TABLE 107. MONTHLY IMPORTS OF MURIATE OF POTASH, IN LONG TONS, 1897 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1897	6,392	2,046	2,637	2,103	2,502	1,448	1,027	2,669	2,183	5,970	8,093	11,520	48,590
1898	2,869	963	2,814	2,856	9,591	2,149	1,653	2,692	1,759	4,280	5,971	8,549	46,146
1899	6,418	1,786	1,592	2,607	3,076	2,410	4,831	4,066	3,097	5,826	5,020	11,704	52,433
1900	5,044	872	3,705	2,316	1,770	3,211	3,781	3,782	3,586	5,930	10,550	13,566	58,113
1901	8,393	544	607	2,993	4,404	2,559	4,869	5,221	3,821	5,313	11,815	15,617	66,156
1902	6,043	345	2,483	1,478	2,766	1,392	1,910	2,721	3,683	8,748	14,664	16,705	62,938
1903	5,578	2,698	2,166	4,080	3,099	6,259	7,358	5,528	8,117	7,135	13,444	10,135	75,597
1904	1,525	2,465	2,667	3,741	5,610	2,951	6,213	6,755	4,809	8,696	14,995	17,638	78,065
1905	11,766	2,233	2,693	4,471	5,445	5,221	5,930	8,650	6,516	11,110	15,338	16,256	95,629
1906	4,454	3,545	2,504	3,894	7,203	9,187	10,865	9,651	9,385	13,637	16,016	13,767	104,108
1907	10,077	4,126	3,281	1,378	5,245	5,829	8,859	12,081	17,609	16,770	13,320	14,061	112,636
1908	7,529	149	1,587	2,506	4,839	6,511	10,218	7,333	9,287	10,861	15,254	19,612	95,686
1909	11,675	5,410	9,599	10,455	10,021	13,010	9,708	9,270	10,159	12,319	16,170	15,622	133,418
1910	16,488	17,622	30,761	15,094	11,489	10,032	11,554	14,313	8,857	7,418	11,747	15,105	170,480
1911	31,192	27,485	28,190	18,474	9,474	8,698	13,739	12,570	16,595	15,969	12,056	32,843	227,285
1912	26,381	23,763	17,330	15,483	14,029	15,200	22,001	15,482	15,535	15,996	17,897	16,201	215,298
1913	21,451	20,167	17,633	11,668	11,878	15,311	16,872	11,155	23,843	14,409	20,756	28,618	213,761
1914	29,804	13,172	20,753	24,078	17,952	16,473	20,664	8,499	2,863	220	5,718	8,313	168,509
1915	23,284	22,818	7,388	2,617	28	320	266	79	81	229	334	300	57,744
1916	258	331	24	25	203	.....	.....	.....	5	.....	215	100	1,161
1917	8	10	.....	60	179	29	107	173	20	55	96	.....	737
1918	.....	79	19	90	.....	84	2	32	46	.....	27	.....	379
1919	.....	45	69	97	1,077	282	183	892	645	2,161	6,629	8,636	20,716
1920	22,293	12,015	20,500	25,889	5,670	4,811	2,550	5,266	6,994	7,887	2,869	4,858	121,602
1921	3,131	6,036	6,587	2,264	1,459	10	1,017	5,313	11,001	10,716	9,346	14,229	71,109
1922	10,498	12,475	14,585	12,575	8,048	21,620	41,122	17,714	2,912	6,326	5,353	8,318	161,546
1923	14,731	12,637	13,462	12,690	3,466	11,730	11,106	12,362	8,670	12,439	7,675	14,529	135,497
1924	11,684	13,258	14,294	6,560	5,169	1,859	6,615	6,870	13,300	19,731	15,927	13,536	128,803
1925	14,955	15,318	17,850	14,463	4,906	10,976	17,885	14,553	15,979	6,983	8,745	18,415	161,028
1926	19,618	19,695	31,240	17,178	7,596	3,128	14,398	16,316	12,329	15,781	21,559	20,353	199,191
1927	18,938	15,011	14,246	5,862	4,660	3,418	23,913	24,489	18,293	18,654	10,706	6,542	163,817
1928	21,616	23,473	14,495	15,358	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce.* From January, 1897, to December, 1912, inclusive, the imports were given in pounds; the tonnage was computed by dividing the number of pounds by 2240.

TABLE 108. VALUE OF MONTHLY IMPORTS OF MURIATE OF POTASH, 1897 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1897.....	$ 220,330	$ 70,839	$ 89,874	$ 71,505	$ 84,661	$ 49,752	$ 35,315	$ 93,011	$ 78,525	$203,911	$286,137	$ 399,612	$ 1,683,472
1898.....	102,159	33,489	95,799	94,840	318,211	76,212	55,634	92,312	61,578	182,245	209,281	298,960	1,620,720
1899.....	213,670	63,762	50,165	91,605	106,740	83,963	147,941	159,984	106,592	199,576	187,134	408,316	1,819,448
1900.....	156,799	31,030	130,623	82,424	73,762	120,073	131,868	131,029	125,155	204,992	322,856	465,993	1,976,604
1901.....	288,549	16,503	20,814	107,932	145,657	84,938	168,584	203,573	124,857	219,765	424,278	511,127	2,316,577
1902.....	196,202	8,941	86,903	49,245	89,183	49,170	70,174	98,489	125,718	294,562	498,605	574,361	2,141,553
1903.....	194,635	98,153	71,498	129,412	106,245	216,361	258,487	179,328	276,485	233,269	454,159	332,446	2,550,478
1904.....	77,326	86,449	89,988	134,533	190,554	94,933	205,617	234,252	169,205	323,228	614,838	611,631	2,832,554
1905.....	387,645	77,716	87,105	146,643	197,842	184,222	202,757	297,434	237,105	402,753	531,925	578,331	3,331,478
1906.....	165,994	132,489	86,108	134,353	250,166	346,356	406,813	356,239	339,032	498,993	596,735	545,617	3,858,895
1907.....	385,329	161,542	117,895	51,030	186,393	214,937	322,542	400,934	647,058	599,484	540,413	547,796	4,175,353
1908.....	283,683	6,191	55,318	82,992	174,338	222,866	366,423	257,191	332,689	394,742	528,164	710,729	3,415,326
1909.....	439,063	176,893	331,269	379,377	381,195	361,162	350,569	337,176	350,510	430,664	577,083	565,145	4,780,106
1910.....	590,232	478,780	902,702	433,319	326,656	297,805	379,306	445,818	272,337	196,704	382,029	546,685	5,252,373
1911.....	1,079,700	921,617	958,563	650,679	335,522	280,616	417,733	411,432	538,277	563,868	415,493	1,078,184	7,651,684
1912.....	897,338	817,182	589,461	528,009	486,988	491,753	687,333	515,140	504,908	535,756	629,205	546,036	7,229,109
1913.....	678,808	661,291	567,305	390,856	406,171	659,247	538,530	360,575	776,521	478,164	669,988	932,599	7,120,055
1914.....	967,886	431,820	715,226	872,116	619,397	552,701	677,704	272,554	104,283	10,135	206,060	311,011	5,740,893
1915.....	831,300	836,368	243,028	121,557	3,845	48,273	38,809	11,532	10,848	33,284	64,001	54,304	2,297,149
1916.....	55,461	100,225	7,861	5,965	79,141	.....	.....	.....	933	.....	80,303	19,072	348,961
1917.....	1,757	1,552	.....	15,570	47,341	8,278	26,228	48,825	3,370	15,971	27,693	.....	196,585
1918.....	.....	21,173	6,515	23,578	.....	21,801	427	9,360	12,422	.....	6,833	.....	102,109
1919.....	.....	10,857	11,093	11,609	104,697	34,009	38,643	86,011	66,750	92,942	445,416	891,889	1,783,916
1920.....	2,119,585	1,418,330	2,340,722	2,371,354	677,525	499,006	306,708	557,703	856,060	804,735	276,021	476,109	12,703,858
1921.....	316,649	615,605	687,212	241,542	151,479	373	35,042	429,750	852,262	655,603	344,523	447,686	4,777,726
1922.....	396,295	443,116	501,276	449,997	291,650	702,380	1,362,648	577,389	122,825	234,209	195,865	272,202	5,549,852
1923.....	386,747	305,664	419,922	422,422	109,356	349,885	327,713	419,778	310,517	403,271	232,096	428,809	4,116,180
1924.....	377,508	436,502	471,835	199,362	162,009	59,491	200,352	225,230	408,372	515,117	491,198	425,390	3,972,366
1925.....	474,493	472,761	548,986	480,367	162,346	332,612	706,148	444,619	517,048	226,531	265,470	562,485	5,193,866
1926.....	639,316	615,689	1,003,865	480,327	237,437	102,126	454,804	505,595	389,654	484,199	630,852	651,966	6,195,830
1927.....	632,160	491,348	461,405	253,819	164,149	132,135	865,519	867,958	620,478	632,924	380,444	247,908	5,739,097
1928.....	759,911	770,929	538,454	572,384	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce.*

TABLE 109. MONTHLY IMPORT PRICES OF MURIATE OF POTASH, PER LONG TON, 1897 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.†
1897	$ 34.47	$ 34.62	$ 34.08	$ 34.00	$ 33.84	$ 34.36	$ 34.39	$ 34.85	$ 35.97	$ 34.16	$ 35.36	$ 34.69	$ 34.65
1898	35.61	34.78	34.04	33.21	33.18	35.46	33.66	34.29	35.01	42.58	35.05	34.97	35.12
1899	33.29	35.70	31.51	35.14	34.70	34.84	30.62	39.35	34.42	34.26	37.28	34.89	34.70
1900	31.09	35.58	35.26	35.59	41.67	37.39	34.88	34.65	34.90	34.57	30.60	34.35	34.01
1901	34.38	30.34	34.29	36.06	33.07	33.19	34.62	38.99	32.68	41.36	35.91	32.73	35.02
1902	32.47	25.92	35.00	33.32	32.24	35.32	36.74	36.20	34.13	33.67	34.00	34.38	34.03
1903	34.89	36.38	33.01	31.72	34.28	34.57	35.13	32.44	34.06	32.69	33.78	32.80	33.74
1904	50.71	35.07	33.74	35.96	33.97	32.17	33.09	34.68	35.19	37.17	41.00	34.68	36.28
1905	32.95	34.80	32.34	32.80	36.33	35.28	34.19	34.39	36.39	36.25	34.68	35.58	34.84
1906	37.27	37.37	34.39	34.50	34.73	37.70	37.44	36.91	36.12	36.59	37.26	39.63	37.07
1907	38.24	39.15	35.93	37.03	35.54	36.87	36.41	33.19	36.75	35.75	40.57	38.96	37.07
1908	37.68	41.55	34.86	33.12	36.03	34.23	35.86	35.07	35.82	36.34	34.62	36.24	35.69
1909	37.61	32.70	34.51	36.29	38.04	35.45	36.11	36.37	34.50	34.96	35.69	36.18	35.83
1910	35.80	27.17	29.35	28.71	28.43	29.69	32.83	31.15	30.75	26.52	32.52	36.19	30.81
1911	34.61	33.53	34.00	35.22	35.42	32.26	30.40	32.73	32.44	35.31	34.46	32.83	33.67
1912	34.01	34.39	34.01	34.10	34.71	32.35	31.24	33.27	32.50	33.49	35.16	33.70	33.58
1913	31.64	32.79	32.17	33.50	34.20	43.06	31.92	32.32	32.57	33.19	32.28	32.59	33.31
1914	32.48	32.78	34.46	36.22	34.50	33.55	32.80	32.07	36.42	46.07	36.04	37.41	34.07
1915	35.70	36.65	32.89	46.46	137.32	150.85	145.90	145.97	133.93	145.34	191.62	181.01	39.78
1916	214.97	302.79	327.54	238.60	389.86	.....	.....	.....	186.60	.....	373.50	190.72	300.57
1917	219.62	155.20	.....	259.50	264.47	285.45	245.12	282.23	168.50	290.38	288.47	.....	266.74
1918	.....	268.01	342.89	261.98	.....	259.54	213.50	292.50	270.04	.....	253.07	.....	269.42
1919	.....	241.27	160.77	119.68	97.21	120.60	156.52	96.42	103.49	43.01	67.19	103.28	86.11
1920	95.08	118.05	114.18	91.60	119.49	103.72	120.28	105.91	122.40	102.03	96.21	98.01	104.47
1921	101.13	101.99	104.33	106.69	103.82	37.30	34.46	80.89	77.47	61.18	36.86	31.46	67.19
1922	37.75	35.52	34.37	35.79	36.24	32.49	33.14	32.60	42.18	37.02	36.59	32.72	34.35
1923	26.25	24.19	31.19	33.29	31.55	29.83	29.51	33.96	35.82	32.42	30.24	29.51	30.38
1924	32.31	32.92	33.01	30.39	31.34	32.00	30.29	32.78	30.70	26.11	30.84	31.43	30.84
1925	31.73	30.86	30.76	33.21	33.09	30.30	39.48	30.55	32.36	32.44	30.36	30.54	32.25
1926	32.59	31.26	32.13	27.96	31.26	32.65	31.59	30.99	31.60	30.68	29.26	32.03	31.10
1927	33.38	32.73	32.39	43.30	35.23	38.66	36.19	35.44	33.92	33.93	35.54	37.89	35.03
1928	35.16	32.84	37.15	37.27	.....	.....	.....	.....	.....	.....	.....	.....	.....

* These prices were obtained by dividing the value of imports by the tonnage imported.
† Weighted average price.

TABLE 110. MONTHLY IMPORTS OF SULFATE OF POTASH, IN LONG TONS, 1906 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1906	.....	.....	.....	.....	.....	.....	1,610	2,546	1,554	4,496	4,987	3,314	.....
1907	2,245	1,381	1,836	50	978	690	1,262	1,630	2,659	4,353	4,188	4,330	25,601
1908	777	25	2,228	441	1,799	1,025	2,396	1,209	1,547	3,694	2,239	3,436	20,816
1909	3,024	2,222	1,819	653	3,045	2,007	1,412	2,108	554	6,432	3,187	4,860	31,323
1910	4,649	6,144	4,972	1,550	2,027	586	1,336	2,558	4,201	3,882	2,398	4,164	38,467
1911	6,665	5,549	9,520	4,649	1,035	1,484	4,426	2,123	4,866	2,657	2,292	8,769	54,035
1912	7,301	2,056	2,572	2,742	1,898	2,774	2,572	3,387	4,906	3,142	7,105	2,920	43,375
1913	4,373	6,651	2,101	1,888	3,046	653	2,930	1,932	2,736	2,724	4,045	6,459	39,538
1914	6,518	5,098	2,474	5,061	2,162	3,000	3,452	2,931	1,080	375	1,900	2,204	36,255
1915	4,928	1,378	2,302	165	33	1,095	200	526	65	262	77	313	11,344
1916	318	280	47	180	19	136	206	.....	8	120	.....	200	1,514
1917	.....	25	.....	54	39	9	26	8	.....	22	6	14	203
1918	26	21	9	3	.....	.....	14	17	.....	.....	.....	.....	90
1919	.....	.....	54	52	.....	.....	26	3	.....	.....	1,100	28	1,263
1920	11	2,595	1,410	171	994	18	1,373	3,730	3,305	1,006	212	359	15,184
1921	244	317	650	172	351	362	373	1,665	124	3,474	2,239	1,153	11,124
1922	5,084	6,786	5,908	11,040	2,918	4,516	9,704	5,078	737	1,309	555	4,084	57,719
1923	5,678	2,451	6,129	9,424	2,909	3,718	6,220	6,146	3,025	7,324	3,917	6,637	63,578
1924	12,731	10,144	6,802	2,166	2,126	1,161	1,465	1,281	3,965	8,312	9,261	16,243	75,657
1925	5,726	9,906	6,575	3,464	624	470	5,375	3,743	11,046	7,570	8,378	6,075	68,952
1926	5,378	3,257	4,012	5,106	1,019	506	7,990	9,202	7,718	9,267	9,858	6,560	69,873
1927	8,588	1,195	1,376	7,246	1,112	422	10,559	15,276	7,687	5,631	3,291	6,521	68,904
1928	7,525	8,217	4,977	9,048	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce.* From 1906 to 1912, inclusive, the imports were reported in pounds; the tonnage was computed by dividing the number of pounds by 2240.

TABLE 111. VALUE OF MONTHLY IMPORTS OF SULFATE OF POTASH, 1906 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1906.....	.....	.....	.....	.....	.....	.....	$ 65,529	$103,804	$ 63,284	$159,703	$171,747	$132,022	.....
1907.....	$ 91,891	$ 62,768	$ 78,586	$ 2,349	$ 39,425	$ 29,689	55,745	64,357	114,022	177,019	173,016	173,910	$1,062,777
1908.....	33,432	1,066	84,126	17,852	74,692	38,347	96,458	53,075	66,873	146,959	96,226	138,622	847,728
1909.....	124,398	93,049	103,877	27,192	122,879	78,998	59,049	86,720	20,269	246,989	145,606	192,179	1,301,205
1910.....	197,042	190,393	152,655	47,831	53,372	20,129	50,792	101,692	169,564	161,582	104,365	177,558	1,426,975
1911.....	273,193	228,341	390,350	197,135	39,379	58,417	187,364	87,415	204,508	105,229	96,456	360,033	2,227,820
1912.....	301,538	83,179	105,070	112,354	77,690	106,000	119,886	139,942	166,787	146,355	294,312	116,563	1,769,676
1913.....	176,261	279,083	88,443	76,088	120,897	28,868	124,147	81,345	109,537	107,302	169,558	271,585	1,633,114
1914.....	276,096	210,327	106,114	220,310	94,788	126,631	152,236	124,316	48,996	18,846	88,502	101,542	1,568,704
1915.....	226,954	59,804	107,728	8,941	2,204	131,692	12,067	54,470	13,163	14,226	7,350	24,800	663,399
1916.....	15,044	15,627	7,174	10,700	1,728	21,459	4,032	.....	298	2,561	.....	3,061	81,684
1917.....	.....	2,826	.....	3,394	3,032	1,334	2,768	1,587	.....	3,700	1,159	1,902	21,702
1918.....	2,263	3,996	1,858	604	.....	.....	3,154	3,454	.....	.....	.....	.....	15,329
1919.....	.....	.....	8,274	8,422	.....	.....	5,216	389	.....	.....	162,800	3,491	188,592
1920.....	781	490,573	241,615	24,996	140,261	3,200	262,568	626,594	309,950	158,486	23,841	60,566	2,343,431
1921.....	32,511	34,913	72,897	18,906	30,385	28,381	29,512	135,218	2,847	173,415	109,016	51,182	719,183
1922.....	234,117	290,859	257,207	489,336	124,603	188,036	332,787	220,687	32,548	58,744	24,620	175,872	2,429,416
1923.....	250,583	103,131	275,458	376,047	116,934	142,555	226,182	254,354	119,920	304,488	153,206	270,063	2,592,921
1924.....	495,129	371,674	277,496	72,796	90,349	49,472	64,329	53,507	170,840	324,495	384,131	502,285	2,856,503
1925.....	230,431	375,083	262,566	139,552	25,652	20,377	223,729	138,967	410,724	298,184	325,742	235,401	2,686,408
1926.....	207,077	138,050	157,130	209,567	42,852	22,051	344,356	378,388	315,704	372,656	378,669	256,558	2,823,058
1927.....	351,694	52,443	56,078	302,554	44,337	18,131	458,685	685,952	320,096	236,892	153,313	267,854	2,947,969
1928.....	333,349	375,194	229,701	419,839	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce*.

TABLE 112. MONTHLY IMPORT PRICES OF SULFATE OF POTASH, PER LONG TON, 1906 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.†
1906	.....	.....	.....	.....	.....	.....	$ 40.70	$ 40.77	$ 40.72	$ 35.52	$ 34.44	$ 39.84	.....
1907	$ 40.93	$ 45.48	$ 42.80	$ 46.98	$ 40.31	$ 43.03	44.17	39.48	42.88	40.67	41.31	40.16	$ 41.51
1908	43.03	42.64	37.76	40.48	41.52	37.41	40.26	43.90	43.23	39.78	42.98	40.34	40.72
1909	41.14	41.88	57.11	41.64	40.35	39.36	41.82	41.14	36.59	38.40	45.69	39.54	41.54
1910	42.38	30.99	30.70	30.86	26.33	34.35	38.02	39.75	40.36	41.62	43.52	42.64	37.10
1911	40.99	41.15	41.00	42.40	38.05	39.36	42.33	41.18	42.03	39.60	42.08	41.06	41.23
1912	41.30	40.46	40.85	40.98	40.93	38.21	46.61	41.32	34.00	46.58	41.42	39.92	40.80
1913	40.31	41.96	42.10	40.30	39.69	44.21	42.37	42.10	40.04	39.39	41.92	42.05	41.30
1914	42.36	41.26	42.89	43.53	43.84	42.21	44.10	42.41	45.37	50.26	46.58	46.07	43.27
1915	46.05	43.40	46.80	54.19	66.79	120.27	60.34	103.56	202.51	54.30	95.45	79.23	58.48
1916	47.31	55.81	152.64	59.44	90.95	157.79	195.73	.....	37.25	213.42	.....	153.05	53.95
1917	.....	113.04	.....	62.85	77.74	148.22	106.46	198.38	.....	168.18	193.17	135.86	106.91
1918	87.04	190.29	206.44	201.33	.....	.....	225.29	203.18	.....	.....	.....	.....	170.32
1919	.....	.....	153.22	161.96	.....	.....	200.62	129.67	.....	.....	148.00	124.68	149.32
1920	71.00	189.05	171.36	146.18	141.11	177.78	191.24	167.99	93.78	157.54	112.46	168.71	154.34
1921	133.24	110.14	112.15	109.92	86.57	78.40	79.12	81.21	22.96	49.92	48.69	44.39	64.65
1922	46.05	42.86	43.54	44.32	42.70	41.64	34.29	43.46	44.16	44.88	44.36	43.06	42.09
1923	44.13	42.08	44.94	39.90	40.20	38.34	36.36	41.39	39.64	41.57	39.11	40.69	40.78
1924	38.89	36.64	40.80	33.61	42.50	42.61	43.91	41.77	43.09	39.04	41.48	30.92	37.76
1925	40.24	37.86	39.93	40.29	41.11	43.36	41.62	37.13	37.18	39.39	38.88	38.75	38.96
1926	38.50	42.39	39.17	41.04	42.05	43.58	43.10	41.12	40.90	40.21	38.41	39.11	40.40
1927	40.95	43.89	40.75	41.75	39.87	42.96	43.44	44.91	41.64	42.07	46.59	41.08	42.78
1928	44.30	45.66	46.15	46.40	.....	.....	.....	.....	.....	.....	.....	.....	.....

* These prices were obtained by dividing the value of imports by the tonnage imported.
† Weighted average price.

TABLE 113. MONTHLY IMPORTS OF MANURE SALTS, IN LONG TONS, 1911 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1911	.....	.....	.....	.....	.....	.....	10,552	19,395	25,236	27,642	13,738	19,999	.....
1912	27,086	13,295	9,372	4,568	6,717	15,138	16,094	10,281	18,981	14,680	21,794	13,202	171,208
1913	23,613	8,184	5,804	8,076	10,216	20,877	21,647	20,175	26,840	18,416	24,856	34,588	223,292
1914	25,694	12,451	8,538	15,939	19,047	33,151	20,602	15,551	6,737	1,225	4,581	4,910	168,426
1915	9,039	900	2,320	.....	197	.....	1,191	.....	.....	200	.....	100	13,947
1916	82	260	166	121	151	.....	.....	.....	.....	224	.....	100	1,104
1917	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	120	70	190
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	626	8,506	6,472	1,358	9,203	14,346	40,511
1920	26,866	50,013	64,501	35,173	7,642	24,642	17,039	23,619	15,191	14,648	23,979	14,598	317,911
1921	5,242	5,713	505	2,634	.....	105	.....	1,064	.....	765	9,874	12,746	38,648
1922	10,677	6,104	13,813	8,536	5,007	12,856	46,303	58,218	3,934	5,155	8,282	16,120	195,005
1923	21,695	10,979	24,926	16,446	971	10,997	17,062	50,233	44,136	31,622	22,745	17,582	269,394
1924	11,884	18,842	21,652	4,247	2,947	2,042	14,357	19,963	29,700	19,760	29,374	51,376	226,144
1925	39,060	29,586	17,840	27,330	4,051	13,046	28,868	43,260	75,566	34,609	28,697	42,319	384,232
1926	32,733	22,475	25,844	19,976	10,261	7,546	33,999	29,416	31,695	32,465	34,317	35,713	316,440
1927	20,245	9,671	11,003	874	355	6,301	36,157	83,451	42,495	35,479	12,018	19,034	277,998
1928	55,510	33,486	30,829	14,768	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce.*

TABLE 114. VALUE OF MONTHLY IMPORTS OF MANURE SALTS, 1911 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1911.....	.....	.....	.....	.....	.....	.....	$102,675	$ 184,840	$186,064	$252,669	$114,905	$228,099	.....
1912.....	$275,727	$ 126,365	$ 86,106	$ 40,161	$ 71,990	$144,470	172,320	116,745	185,934	162,541	274,469	137,822	$1,794,650
1913.....	229,664	90,703	60,656	75,060	94,216	193,928	236,231	200,288	259,898	210,567	247,431	351,548	2,250,190
1914.....	269,747	124,422	95,038	202,900	203,632	365,539	200,518	166,371	77,722	14,480	54,834	67,446	1,842,649
1915.....	127,793	14,748	29,148	.....	7,639	.....	22,474	.....	.....	4,124	.....	1,748	207,674
1916.....	1,480	4,735	3,024	2,113	2,127	.....	.....	.....	.....	5,475	.....	2,319	21,273
1917.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,164	3,708	8,872
1918.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919.....	.....	.....	.....	.....	.....	.....	18,360	210,418	169,775	41,186	327,312	502,699	1,269,750
1920.....	740,510	1,312,025	2,534,315	1,396,820	252,810	813,390	487,124	824,256	547,018	508,622	817,938	495,446	10,730,274
1921.....	179,800	187,708	17,685	94,553	.....	4,667	10	25,204	.....	19,497	120,531	142,946	792,601
1922.....	135,452	84,864	127,615	105,078	72,854	123,392	422,577	537,456	48,158	50,755	84,651	155,756	1,948,608
1923.....	209,402	120,697	263,111	155,762	13,482	97,640	226,630	624,216	499,346	317,978	234,525	177,004	2,939,793
1924.....	172,800	174,063	178,952	38,059	23,509	19,980	165,343	181,740	315,990	180,732	259,416	507,390	2,217,974
1925.....	335,490	283,991	179,015	226,071	40,235	122,201	285,802	442,220	713,246	330,679	298,435	419,235	3,676,620
1926.....	353,146	239,455	256,634	189,278	120,696	67,536	348,458	328,280	332,728	346,575	388,267	420,057	3,391,100
1927.....	236,953	106,141	107,308	10,526	7,814	75,841	502,431	1,178,572	578,117	472,432	170,504	218,746	3,676,535
1928.....	708,011	431,057	414,931	186,068	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce.*

TABLE 115. MONTHLY IMPORT PRICES OF MANURE SALTS, PER LONG TON, 1911 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.†
1911	.....	.....	.....	.....	.....	.....	$ 9.73	$ 9.53	$ 7.37	$ 9.14	$ 8.36	$11.41	.....
1912	$10.18	$ 9.50	$ 9.19	$ 8.79	$10.72	$ 9.54	10.71	11.36	9.80	11.07	12.59	10.44	$10.48
1913	9.73	11.08	10.45	9.29	9.22	9.29	10.91	9.93	9.68	11.43	9.95	10.16	10.08
1914	10.50	9.99	11.13	12.73	10.69	11.03	9.73	10.70	11.54	11.82	11.97	13.74	10.94
1915	14.14	16.39	12.56	.....	38.78	.....	18.87	.....	.....	20.62	.....	17.48	14.89
1916	18.05	18.21	18.22	17.46	14.09	.....	.....	.....	.....	24.44	.....	23.19	19.27
1917	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43.03	52.97	46.69
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	29.32	24.74	26.23	30.33	35.57	35.04	31.34
1920	27.56	26.23	39.29	39.71	33.08	33.01	28.59	34.90	36.01	34.72	34.11	33.94	33.75
1921	34.30	32.86	35.02	35.90	.....	44.45	.....	23.69	.....	25.49	12.21	11.21	20.51
1922	12.69	13.90	9.24	12.31	14.55	9.60	9.13	9.23	12.24	9.85	10.22	9.66	9.99
1923	9.65	10.99	10.56	9.47	13.88	8.88	13.28	12.43	11.31	10.06	10.31	10.07	10.91
1924	14.54	9.24	8.26	8.96	7.98	9.78	11.52	9.10	10.64	9.15	8.83	9.88	9.81
1925	8.59	9.60	10.03	8.27	9.93	9.37	9.90	10.22	9.44	9.55	10.40	9.91	9.57
1926	10.79	10.65	9.93	9.48	11.76	8.95	10.25	11.16	10.50	10.68	11.31	11.76	10.72
1927	11.70	10.98	9.75	12.04	22.01	12.04	13.90	14.12	13.60	13.32	14.19	11.49	13.23
1928	12.75	12.87	13.46	12.60	.....	.....	.....	.....	.....	.....	.....	.....	.....

* These prices were obtained by dividing the value of imports by the tonnage imported.
† Weighted average price.

TABLE 116. MONTHLY IMPORTS OF KAINIT, IN LONG TONS, 1911 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1911	.....	.....	.....	.....	.....	.....	24,671	15,787	34,821	42,902	33,017	107,478	.....
1912	93,550	67,060	13,139	16,294	10,287	26,126	32,543	50,703	50,615	44,519	42,057	65,101	511,994
1913	72,003	26,769	28,425	23,228	6,744	24,088	31,448	35,127	44,723	56,108	54,470	62,717	465,850
1914	68,509	72,008	61,152	25,733	11,960	17,891	34,625	25,327	11,836	.....	4	566	329,611
1915	306	1,852	1,628	.....	.....	2,860	.....	.....	.....	.....	.....	28	6,674
1916	.....	30	.....	.....	6	.....	.....	.....	.....	.....	.....	.....	36
1917	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	10,743	9,567	4,963	6,498	19,503	51,274
1920	23,962	37,213	41,624	48,357	28,314	44,017	13,137	26,508	23,931	22,888	39,537	25,244	374,732
1921	20,946	14,422	12,748	2,715	2,758	.....	.....	.....	.....	1,232	3,478	10,777	69,076
1922	16,504	13,211	9,693	11,768	3,287	13,621	39,254	19,685	3,783	4,773	3,758	10,520	149,857
1923	25,488	3,924	27,032	21,883	3,571	4,843	5,960	5,460	18,613	18,569	5,900	22,918	164,161
1924	24,022	24,831	38,903	12,012	3,388	712	3,636	4,552	4,742	2,574	19,114	16,468	154,954
1925	15,496	20,515	28,961	17,457	4,516	4,857	7,555	19,043	27,720	10,318	6,629	19,761	182,828
1926	18,981	30,169	27,205	13,382	5,583	4,609	11,393	9,894	5,377	11,582	13,323	30,379	181,877
1927	19,167	21,694	18,162	4,830	402	1,000	3,310	9,934	8,478	6,575	3,152	6,283	102,987
1928	19,803	23,815	14,390	6,164	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce.*

TABLE 117. VALUE OF MONTHLY IMPORTS OF KAINIT, 1911 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1911.....	.....	.....	.....	.....	.....	.....	$108,680	$ 89,751	$166,055	$226,939	$219,259	$529,356	.....
1912.....	$416,524	$335,400	$ 63,342	$ 88,365	$ 40,486	$115,604	151,126	246,843	226,119	212,317	190,418	299,818	$2,386,362
1913.....	327,001	125,559	129,167	100,044	30,507	116,058	145,801	176,640	197,410	291,221	256,259	311,351	2,207,018
1914.....	316,392	321,723	300,445	116,950	59,641	85,786	163,627	119,576	63,099	.....	20	3,620	1,550,879
1915.....	1,989	18,445	11,119	.....	.....	63,265	.....	.....	.....	.....	.....	622	95,440
1916.....	.....	873	.....	.....	300	.....	.....	.....	.....	.....	.....	.....	1,173
1917.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1918.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919.....	.....	.....	.....	.....	.....	.....	.....	173,390	135,130	102,973	137,826	372,162	921,481
1920.....	506,763	706,520	842,187	1,032,106	703,424	943,179	278,534	560,755	614,541	514,268	975,493	590,261	8,268,031
1921.....	534,592	351,451	336,169	64,564	62,346	.....	.....	.....	.....	18,439	25,725	60,568	1,453,854
1922.....	98,747	116,413	70,788	87,784	24,690	82,184	288,695	98,451	26,162	36,283	24,167	68,966	1,023,330
1923.....	139,969	24,383	157,037	142,963	17,683	23,295	29,698	37,810	133,020	92,562	32,635	125,795	956,850
1924.....	179,309	122,970	237,264	63,764	19,972	5,333	28,242	27,521	27,856	14,691	100,282	86,612	913,816
1925.....	98,013	140,777	178,922	93,914	25,990	32,457	44,390	118,478	191,692	68,179	35,000	145,313	1,173,125
1926.....	116,938	191,529	176,667	91,640	45,027	28,089	69,588	65,461	31,393	80,155	100,202	218,477	1,215,166
1927.....	138,999	160,431	132,104	41,371	2,469	7,208	33,602	85,946	69,784	56,857	35,781	49,457	815,009
1928.....	157,692	196,425	113,179	51,813	.....	.....	.....	.....	.....	.....	.....	.....	.....

* United States Department of Commerce, Bureau of Foreign and Domestic Commerce, *Monthly Summary of Foreign Commerce*.

TABLE 118. MONTHLY IMPORT PRICES OF KAINIT, PER LONG TON, 1911 TO 1928*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.†
1911	.....	.....	.....	.....	.....	.....	$ 4.41	$ 5.69	$ 4.77	$ 5.29	$ 6.64	$ 4.93	.....
1912	$ 4.45	$ 5.00	$ 4.82	$ 5.42	$ 3.94	$ 4.42	4.64	4.87	4.47	4.77	4.53	4.61	$ 4.66
1913	4.54	4.69	4.54	4.31	4.52	4.82	4.64	5.03	4.41	5.19	4.70	4.96	4.74
1914	4.62	4.47	4.91	4.54	4.99	4.79	4.73	4.72	5.33	.....	5.00	6.40	4.71
1915	6.50	9.96	6.83	.....	.....	22.12	.....	.....	.....	.....	.....	22.21	14.30
1916	.....	29.10	.....	.....	50.00	.....	.....	.....	.....	.....	.....	.....	32.58
1917	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1919	.....	.....	.....	.....	.....	.....	.....	16.14	14.12	20.75	21.21	19.08	17.97
1920	21.15	18.99	20.23	21.34	24.84	21.43	21.20	21.15	25.67	22.47	24.67	23.38	22.06
1921	25.52	24.37	26.37	23.78	22.61	.....	.....	.....	.....	14.97	7.40	5.62	21.05
1922	5.98	8.81	7.30	7.46	7.51	6.03	7.35	5.00	6.92	7.60	6.43	6.56	6.83
1923	5.49	6.21	5.81	6.53	4.95	4.81	4.98	6.92	7.15	4.98	5.53	5.49	5.83
1924	7.46	4.95	6.10	5.31	5.89	7.49	7.77	6.05	5.87	5.71	5.25	5.26	5.90
1925	6.33	6.86	6.18	5.38	5.76	6.68	5.88	6.22	6.92	6.61	5.28	7.35	6.42
1926	6.16	6.35	6.49	6.85	8.07	6.09	6.11	6.62	5.84	6.92	7.52	7.19	6.68
1927	7.30	7.40	7.27	8.57	6.14	7.21	10.15	8.65	8.23	8.65	11.35	7.87	7.91
1928	7.96	8.25	7.87	8.41	.....	.....	.....	.....	.....	.....	.....	.....	.....

* These prices were obtained by dividing the value of imports by the tonnage imported.
† Weighted average price.

TABLE 119. FERTILIZER TONNAGE IN THE SOUTH ATLANTIC STATES, 1909 TO 1926 *

Year	Delaware	Maryland	Virginia	West Virginia	North Carolina	South Carolina	Georgia	Florida	Total
1909	20,000	142,000	323,644	26,000	512,716	758,363	807,832	156,340	2,746,895
1910	23,000	148,000	344,951	32,500	630,909	975,039	1,022,048	172,641	3,349,088
1911	25,000	158,000	359,465	31,250	711,380	1,048,806	1,202,722	183,437	3,720,060
1912	30,000	160,000	372,108	31,750	695,705	886,222	1,103,864	187,927	3,467,576
1913	50,000	169,000	412,434	31,852	840,447	918,336	1,120,693	213,728	3,756,490
1914	55,000	183,350	437,808	35,475	872,820	1,095,728	1,282,088	240,812	4,203,081
1915	45,000	168,000	406,077	46,010	647,188	670,610	872,979	208,782	3,064,646
1916	45,000	154,000	369,520	40,000	650,000	833,624	741,347	212,250	3,045,741
1917	50,000	191,900	496,217	41,000	849,728	850,790	895,897	214,088	3,589,620
1918	54,000	173,000	430,549	59,036	921,962	1,064,886	923,020	197,954	3,824,407
1919	30,398	174,500	421,484	63,000	961,238	1,033,887	990,919	250,613	3,926,039
1920	61,735	172,410	465,247	121,052	1,170,440	1,098,487	1,003,053	262,061	4,354,485
1921	37,472	140,052	369,490	28,870	690,544	598,893	535,638	290,618	2,691,577
1922	40,344	156,188	449,942	38,071	951,174	526,599	521,547	353,769	3,037,634
1923	36,931	155,168	422,350	40,000	1,066,553	693,386	675,867	398,564	3,488,819
1924	36,224	151,211	441,895	40,000	1,183,053	844,440	678,959	365,317	3,741,099
1925	41,006	165,474	451,656	41,000	1,217,822	873,255	778,808	358,463	3,927,484
1926	40,000	163,285	435,223	41,000	1,218,176	840,128	780,302	398,480	3,916,594

* Data from the *American Fertilizer Hand Book*.

TABLE 120. FERTILIZER TONNAGE IN THE NORTH ATLANTIC STATES, 1909 TO 1926*

Year	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	New York	New Jersey	Pennsylvania	Total
1909	100,000	16,000	17,000	55,000	10,000	40,000	325,000	110,000	275,000	948,000
1910	125,000	14,000	18,000	65,000	10,300	42,000	375,000	125,000	300,000	1,074,300
1911	140,000	15,000	20,000	72,000	12,000	45,000	400,000	135,000	315,000	1,154,000
1912	150,000	15,000	12,000	48,000	8,000	48,000	376,000	140,000	318,716	1,115,716
1913	160,000	18,000	14,500	51,000	9,000	62,000	380,000	156,661	340,000	1,191,161
1914	168,000	20,000	18,000	54,000	12,500	74,000	420,000	155,414	381,900	1,303,814
1915	150,000	16,000	13,500	56,000	11,000	80,000	400,000	153,075	316,319	1,195,894
1916	155,000	18,000	15,000	53,000	12,000	73,000	400,000	129,800	268,455	1,124,255
1917	160,923	20,000	14,500	64,000	11,500	78,000	420,000	176,483	334,309	1,279,715
1918	155,000	18,000	16,000	68,000	10,000	80,000	430,000	153,198	340,898	1,271,096
1919	156,000	14,000	18,000	61,000	9,000	65,000	410,000	149,485	340,000	1,222,485
1920	168,000	17,000	20,000	61,421	10,000	75,000	385,000	164,821	332,926	1,234,168
1921	151,375	14,000	15,000	61,013	8,000	65,000	325,000	163,487	321,284	1,124,159
1922	172,000	15,000	16,000	65,986	8,500	70,000	350,000	176,424	322,210	1,196,120
1923	168,000	17,000	18,000	63,709	9,000	75,000	375,000	157,497	308,742	1,191,948
1924	182,000	16,000	17,000	61,968	8,800	78,636	375,000	152,827	319,685	1,211,916
1925	185,000	16,000	18,000	62,656	9,000	78,000	375,000	146,687	326,121	1,216,464
1926	192,000	16,000	18,000	58,920	9,000	70,000	338,250	146,687	330,000	1,178,857

* Data from the *American Fertilizer Hand Book*.

TABLE 121. FERTILIZER TONNAGE IN THE SOUTH CENTRAL STATES, 1909 TO 1926*

Year	Kentucky	Tennessee	Alabama	Mississippi	Louisiana	Texas	Oklahoma	Arkansas	Total
1909	43,000	54,142	400,000	139,884	83,719	23,800	4,000	25,000	773,545
1910	58,000	58,612	425,000	132,776	88,396	34,000	6,000	30,000	832,784
1911	65,000	65,000	440,000	148,237	91,085	52,985	8,000	40,000	910,307
1912	65,000	77,473	452,215	119,710	75,555	45,000	10,000	50,000	894,953
1913	75,000	84,060	474,730	128,050	98,778	75,500	2,000	52,000	990,118
1914	83,000	93,550	592,200	127,400	90,588	77,400	2,000	84,850	1,150,988
1915	85,000	77,390	302,350	85,414	73,420	17,500	2,000	26,396	669,470
1916	62,000	91,128	206,000	75,667	96,426	39,845	3,000	65,500	639,566
1917	93,000	99,584	210,000	76,717	98,264	40,500	3,000	58,500	679,565
1918	128,000	113,000	289,990	104,700	81,025	58,000	3,000	88,500	866,215
1919	103,000	109,366	297,903	110,000	97,724	46,000	4,000	64,427	832,420
1920	90,000	98,535	374,860	131,084	110,765	55,405	4,000	77,550	942,199
1921	62,000	64,010	168,239	61,248	36,284	21,622	2,000	22,225	437,628
1922	85,000	89,519	284,370	142,517	75,050	33,912	2,500	36,115	748,983
1923	90,000	106,361	447,913	208,385	104,624	78,787	3,600	79,616	1,119,286
1924	85,000	115,230	456,840	206,122	124,668	127,791	4,000	96,750	1,216,401
1925	93,000	142,174	598,115	258,028	110,784	101,008	5,000	123,387	1,431,496
1926	91,500	156,336	615,364	278,075	114,347	125,150	5,000	126,095	1,511,867

* Data from the *American Fertilizer Hand Book*.

TABLE 122. FERTILIZER TONNAGE IN THE NORTH CENTRAL STATES EAST OF THE MISSISSIPPI RIVER, 1909 TO 1926*

Year	Ohio	Indiana	Illinois	Michigan	Wisconsin	Total
1909	137,000	134,064	50,000	35,000	1,500	357,564
1910	142,000	151,856	55,000	40,000	2,000	390,856
1911	148,000	179,839	60,000	45,000	2,500	435,339
1912	151,784	143,678	25,000	51,000	3,500	374,962
1913	183,476	193,899	30,000	57,985	4,000	469,360
1914	230,000	219,000	40,000	60,000	4,500	553,500
1915	225,000	156,152	35,000	65,000	5,000	486,152
1916	187,848	132,159	10,000	70,000	5,000	405,007
1917	165,837	156,000	10,000	91,455	6,500	429,792
1918	219,328	244,340	12,000	78,000	7,500	561,168
1919	305,236	241,000	12,000	103,264	10,000	671,500
1920	300,000	231,791	15,000	112,616	12,000	671,407
1921	255,000	187,923	12,000	83,465	13,000	551,388
1922	310,885	209,310	13,707	86,281	14,000	634,183
1923	303,120	198,581	16,719	83,645	15,000	617,065
1924	321,287	192,417	17,527	94,575	15,000	640,806
1925	321,960	226,148	24,582	109,327	12,500	694,517
1926	304,480	245,000	25,227	109,327	16,000	700,034

* Data from the *American Fertilizer Hand Book*.

TABLE 123. FERTILIZER TONNAGE IN THE NORTH CENTRAL STATES WEST OF THE MISSISSIPPI RIVER, 1909 TO 1926*

Year	Minnesota	Iowa	Missouri	North Dakota	South Dakota	Nebraska	Kansas	Total
1909	800	1,500	27,701	.....	.....	100	1,095	31,196
1910	1,800	1,800	31,585	250	100	200	1,210	36,945
1911	2,000	2,000	41,685	500	200	300	1,500	48,185
1912	2,400	2,500	38,359	500	300	500	5,000	49,559
1913	3,500	3,500	60,000	500	700	500	7,380	76,080
1914	3,800	4,200	65,000	550	1,000	500	9,460	84,510
1915	4,000	5,100	57,000	600	1,500	500	10,060	78,760
1916	4,500	5,000	41,000	700	1,500	500	9,740	62,940
1917	4,500	5,000	65,000	1,000	2,500	500	7,600	86,100
1918	5,000	5,000	90,000	1,000	2,500	500	8,000	112,000
1919	5,000	5,000	91,000	1,000	3,000	500	16,937	122,437
1920	5,000	5,000	92,737	200	200	500	12,650	116,287
1921	4,000	3,000	51,502	125	100	400	4,303	63,430
1922	4,400	3,500	50,021	125	125	500	4,500	63,171
1923	4,500	4,000	51,597	150	150	500	4,600	65,497
1924	4,450	4,500	47,121	200	150	500	4,500	61,421
1925	5,000	6,000	63,939	225	150	500	4,138	79,952
1926	7,500	6,000	56,891	250	150	500	7,746	79,037

* Data from the *American Fertilizer Hand Book*.

TABLE 124. FERTILIZER TONNAGE IN THE FAR WESTERN STATES, 1909 TO 1926*

Year	Montana	Wyoming	Colorado	New Mexico	Arizona	Utah	Nevada	Idaho	Washington	Oregon	California	Total
1909.....	.....	....	500	....	....	.....	.....	....	1,250	1,500	40,000	43,250
1910.....	200	100	500	200	200	400	160	....	1,300	2,500	41,000	46,560
1911.....	600	125	500	200	350	600	500	....	1,300	3,000	49,700	56,875
1912.....	700	150	500	200	500	700	600	....	1,400	3,500	50,000	58,250
1913.....	800	200	500	200	600	1,000	800	200	1,500	4,500	36,000	46,300
1914.....	900	400	500	200	650	1,200	950	500	2,400	6,300	39,471	53,471
1915.....	1,000	500	600	500	650	1,500	1,000	500	3,000	6,500	31,450	47,200
1916.....	1,000	500	1,000	500	600	1,000	1,000	500	3,000	6,500	29,415	45,015
1917.....	1,000	500	1,000	500	500	1,000	1,000	500	4,000	7,000	43,964	60,964
1918.....	1,000	500	1,000	500	500	1,000	1,000	500	4,010	6,000	32,036	48,046
1919.....	1,000	500	1,000	1,500	500	1,000	1,000	500	4,000	7,500	43,126	61,626
1920.....	100	100	1,000	700	500	600	30	400	9,000	6,000	66,380	84,180
1921.....	50	50	500	400	300	400	20	400	7,500	5,500	72,629	87,749
1922.....	80	80	750	430	325	400	30	400	8,000	7,500	74,819	92,814
1923.....	100	100	800	450	500	500	30	400	10,000	8,000	71,819	92,699
1924.....	100	100	800	500	500	500	30	400	11,000	7,500	66,274	87,704
1925.....	100	100	800	600	500	500	30	400	12,000	8,000	85,933	108,963
1926.....	100	100	800	750	500	500	30	420	15,000	8,500	93,845	120,545

* Data from the *American Fertilizer Hand Book*.

TABLE 125. MONTHLY SALES OF FERTILIZER TAGS, VIRGINIA, 1907 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1907	35,409	18,999	35,904	47,389	11,030	2,750	3,639	31,297	42,012	10,109	1,561	4,200	244,299
1908	25,895	22,916	40,658	69,318	12,135	2,600	5,753	29,195	55,252	4,259	2,270	5,698	275,949
1909	35,278	42,978	52,155	57,034	18,306	4,418	4,235	36,722	10,679	51,323	1,982	8,534	323,644
1910	33,185	47,421	59,294	80,066	18,958	4,632	5,203	36,563	47,174	17,200	1,026	5,461	356,183
1911	43,384	31,040	62,507	70,589	34,386	5,928	4,536	36,478	53,546	10,537	1,381	5,333	359,645
1912	32,713	44,152	50,376	89,423	33,890	6,303	4,578	40,832	46,736	15,693	1,216	6,382	372,294
1913	53,556	44,727	75,783	87,846	21,587	3,719	4,319	40,693	52,767	14,722	1,464	11,421	412,604
1914	60,171	46,836	52,473	104,688	41,424	4,506	6,700	33,480	65,251	12,746	3,043	6,710	438,028
1915	58,605	49,861	48,890	92,496	19,872	5,421	6,637	37,500	63,450	14,801	4,215	4,532	406,280
1916	41,400	57,553	56,435	47,552	14,660	5,166	3,400	36,833	64,725	15,246	3,000	20,900	366,870
1917	69,558	66,660	55,346	49,750	32,564	18,488	35,550	45,000	43,500	25,993	5,791	47,761	495,961
1918	46,000	68,944	61,907	42,650	24,384	6,112	36,232	39,730	52,866	28,443	451	22,280	429,999
1919	43,138	46,072	71,252	60,046	9,604	5,466	24,205	59,718	50,931	14,893	3,000	33,111	421,436
1920	98,405	28,008	80,570	67,798	35,168	9,616	22,647	71,842	28,767	7,776	1,116	13,534	465,247
1921	35,649	54,598	83,532	61,571	8,238	8,627	17,925	20,617	45,440	23,880	4,503	4,910	369,490
1922	65,667	48,816	62,436	107,572	20,106	10,373	12,393	51,835	40,516	8,525	430	21,273	449,942
1923	64,345	55,719	67,265	89,926	18,420	7,236	16,232	21,394	43,602	19,569	838	11,274	415,820
1924	82,870	59,789	66,438	93,180	36,916	4,599	4,180	20,075	44,179	23,545	1,274	4,850	441,895
1925	58,074	67,185	75,217	122,571	19,339	7,591	4,045	22,701	45,001	21,276	300	8,356	451,656
1926	57,766	72,789	64,517	97,630	30,428	7,175	1,927	10,600	65,693	18,750	631	7,317	435,223
1927	50,080	67,435	71,837	89,558	16,845	5,198	6,355	14,585	56,784	17,813	1,917	9,601	408,008
1928	57,818	68,768	74,080	103,918	27,431	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 126. PERCENTAGE OF FERTILIZER TAGS SOLD EACH MONTH, VIRGINIA, 1907 TO 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1907	14.5	7.8	14.7	19.4	4.5	1.1	1.5	12.8	17.2	4.1	0.6	1.7
1908	9.4	8.3	14.7	25.1	4.4	0.9	2.1	10.6	20.0	1.5	0.8	2.1
1909	10.9	13.3	16.1	17.6	5.7	1.4	1.3	11.3	3.3	15.9	0.6	2.6
1910	9.3	13.3	16.6	22.5	5.3	1.3	1.5	10.3	13.2	4.8	0.3	1.5
1911	12.1	8.6	17.4	19.6	9.6	1.6	1.3	10.1	14.9	2.9	0.4	1.5
1912	8.8	11.9	13.5	24.0	9.1	1.7	1.2	11.0	12.6	4.2	0.3	1.7
1913	13.0	10.8	18.4	21.3	5.2	0.9	1.0	9.9	12.8	3.6	0.4	2.8
1914	13.7	10.7	12.0	23.9	9.5	1.0	1.5	7.6	14.9	2.9	0.7	1.5
1915	14.4	12.3	12.0	22.8	4.9	1.3	1.6	9.2	15.6	3.6	1.0	1.1
1916	11.3	15.7	15.4	13.0	4.0	1.4	0.9	10.0	17.6	4.2	0.8	5.7
1917	14.0	13.4	11.2	10.0	6.6	3.7	7.2	9.1	8.8	5.2	1.2	9.6
1918	10.7	16.0	14.4	9.9	5.7	1.4	8.4	9.2	12.3	6.6	0.1	5.2
1919	10.2	10.9	16.9	14.2	2.3	1.3	5.7	14.2	12.1	3.5	0.7	7.9
1920	21.2	6.0	17.3	14.6	7.6	2.1	4.9	15.4	6.2	1.7	0.2	2.9
1921	9.6	14.8	22.6	16.7	2.2	2.3	4.9	5.6	12.3	6.5	1.2	1.3
1922	14.6	10.8	13.9	23.9	4.5	2.3	2.8	11.5	9.0	1.9	0.1	4.7
1923	15.5	13.4	16.2	21.6	4.4	1.7	3.9	5.1	10.5	4.7	0.2	2.7
1924	18.8	13.5	15.0	21.1	8.4	1.0	0.9	4.5	10.0	5.3	0.3	1.1
1925	12.9	14.9	16.7	27.1	4.3	1.7	0.9	5.0	10.0	4.7	0.1	1.9
1926	13.3	16.7	14.8	22.4	7.0	1.6	0.4	2.4	15.1	4.3	0.1	1.7
1927	12.3	16.5	17.6	22.0	4.1	1.3	1.6	3.6	13.9	4.4	0.2	1.8

TABLE 127. MONTHLY SALES OF FERTILIZER TAGS, NORTH CAROLINA, 1906 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1906	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13,096	.....
1907	84,360	85,630	152,758	84,402	4,846	3,285	580	.....	.....	29,215	995	6,516	452,587
1908	72,526	105,203	171,115	93,238	11,992	3,547	4,764	300	16,015	22,135	491	5,898	507,224
1909	58,501	89,172	187,128	95,263	23,071	3,850	4,732	250	15,575	23,706	5,580	11,253	518,081
1910	58,302	104,826	201,112	169,670	21,058	13,016	3,142	4,075	7,800	29,601	7,050	9,614	629,266
1911	61,639	114,154	258,038	165,866	28,936	14,520	4,290	745	18,042	28,136	7,400	6,729	708,495
1912	50,730	103,636	213,002	225,060	21,358	18,082	6,115	475	22,125	26,196	2,200	12,351	701,330
1913	83,378	153,346	300,195	170,988	40,126	15,775	5,825	4,220	24,200	27,445	2,600	20,640	848,738
1914	96,808	101,584	318,695	220,336	34,226	23,040	7,990	950	20,670	25,444	2,445	1,535	853,723
1915	44,861	56,160	239,622	211,380	24,100	11,505	2,470	2,934	31,472	18,800	2,350	9,325	654,979
1916	62,494	125,192	209,056	113,986	10,294	13,973	6,151	3,450	26,863	29,575	16,301	26,405	643,740
1917	136,249	173,777	251,568	113,622	26,515	30,046	8,389	4,030	32,600	30,150	16,378	107,653	930,977
1918	137,464	234,888	216,697	102,875	26,712	10,118	3,742	11,206	32,065	28,451	10,090	43,728	858,036
1919	162,012	140,064	306,390	195,568	17,450	10,458	2,788	7,200	17,675	11,402	46,505	69,856	987,368
1920	259,337	261,610	276,404	173,933	103,991	27,243	1,247	20,850	13,625	11,300	2,400	18,500	1,170,440
1921	42,564	86,022	261,645	204,487	15,922	18,674	4,101	5,270	13,425	24,235	698	13,501	690,544
1922	86,221	107,125	395,915	229,060	29,852	15,132	1,928	8,125	26,700	18,653	4,064	28,400	951,175
1923	141,928	297,334	366,661	147,206	32,567	8,246	2,536	3,400	23,660	19,795	9,500	13,720	1,066,553
1924	152,759	281,670	384,304	245,577	45,799	6,596	1,834	4,863	12,384	19,213	6,583	21,471	1,183,053
1925	114,041	169,168	512,325	315,070	34,658	5,856	2,560	2,618	11,366	27,211	1,283	21,667	1,217,823
1926	121,704	213,368	467,190	281,505	42,455	20,251	2,439	1,600	12,718	27,800	3,751	23,395	1,218,176
1927	142,402	155,470	384,502	330,725	37,844	21,374	6,995	4,401	29,700	18,098	1,645	38,342	1,171,498
1928	162,936	183,604	570,181	290,965	59,644	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 128. PERCENTAGE OF FERTILIZER TAGS SOLD EACH MONTH, NORTH CAROLINA, 1907 TO 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1907	18.6	18.9	33.8	18.6	1.1	0.7	0.1	.....	.....	6.5	0.2	1.4
1908	14.3	20.7	33.7	18.4	2.4	0.7	0.9	0.1	3.2	4.4	0.1	1.2
1909	11.3	17.2	36.1	18.4	4.5	0.7	0.9	.....	3.0	4.6	1.1	2.2
1910	9.3	16.7	32.0	27.0	3.3	2.1	0.5	0.6	1.2	4.7	1.1	1.5
1911	8.7	16.1	36.4	23.4	4.1	2.0	0.6	0.1	2.5	4.0	1.0	0.9
1912	7.2	14.8	30.4	32.1	3.0	2.6	0.9	0.1	3.2	3.7	0.3	1.8
1913	9.8	18.1	35.4	20.1	4.7	1.9	0.7	0.5	2.9	3.2	0.3	2.4
1914	11.3	11.9	37.3	25.8	4.0	2.7	0.9	0.1	2.4	3.0	0.3	0.2
1915	6.8	8.6	36.6	32.3	3.7	1.8	0.4	0.4	4.8	2.9	0.4	1.4
1916	9.7	19.4	32.5	17.7	1.6	2.2	1.0	0.5	4.2	4.6	2.5	4.1
1917	14.6	18.7	27.0	12.2	2.8	3.2	0.9	0.4	3.5	3.2	1.8	11.6
1918	16.0	27.4	25.3	12.0	3.1	1.2	0.4	1.3	3.7	3.3	1.2	5.1
1919	16.4	14.2	31.0	19.8	1.8	1.1	0.3	0.7	1.8	1.2	4.7	7.1
1920	22.2	22.4	23.6	14.9	8.9	2.3	0.1	1.8	1.2	1.0	0.2	1.6
1921	6.2	12.5	37.9	29.6	2.3	2.7	0.6	0.8	1.9	3.5	0.1	2.0
1922	9.1	11.3	41.6	24.1	3.1	1.6	0.2	0.9	2.8	2.0	0.4	3.0
1923	13.3	27.9	34.4	13.8	3.1	0.8	0.2	0.3	2.2	1.9	0.9	1.3
1924	12.9	23.8	32.5	20.8	3.9	0.6	0.2	0.5	1.0	1.6	0.6	1.8
1925	9.4	13.9	42.1	25.9	2.8	0.5	0.2	0.2	0.9	2.2	0.1	1.8
1926	10.0	17.5	38.4	23.1	3.5	1.7	0.2	0.1	1.0	2.3	0.3	1.9
1927	12.2	13.3	32.8	28.2	3.2	1.8	0.6	0.4	2.5	1.5	0.1	3.3

TABLE 129. MONTHLY SALES OF FERTILIZER TAGS, SOUTH CAROLINA, 1890 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1890	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000	.....
1891	98,239	66,134	42,665	5,255	12,000	100	1,033	500	100	250	6,187	5,504	237,967
1892	21,352	72,257	36,202	1,645	10	.....	.....	.....	750	530	5,315	10,143	148,204
1893	52,532	81,185	46,155	3,855	175	176	.....	.....	.....	1,440	4,828	5,533	195,879
1894	43,343	70,043	45,408	2,250	156	.....	.....	100	440	1,594	3,069	2,183	168,586
1895	15,274	12,360	70,195	16,061	316	62	.....	24	600	400	5,287	6,549	127,128
1896	64,352	83,822	32,602	3,552	298	220	.....	82	1,604	1,030	6,190	12,510	206,262
1897	58,784	104,819	55,326	4,975	568	258	.....	220	430	1,752	4,950	5,328	237,410
1898	67,214	118,303	21,888	6,250	.....	98	109	650	730	2,880	3,870	9,985	261,977
1899	32,650	83,350	102,038	5,890	50	85	40	150	450	1,745	11,641	10,407	248,496
1900	91,450	119,787	44,513	2,649	280	54	30	630	2,080	10,620	16,700	12,064	300,857
1901	104,263	126,528	77,012	2,146	165	.....	40	40	725	7,485	7,690	10,200	336,294
1902	56,097	106,425	98,040	15,101	290	300	888	450	4,350	15,871	11,222	17,946	326,980
1903	109,263	142,670	108,347	2,413	448	526	310	1,220	2,950	6,730	9,282	11,481	395,640
1904	140,356	183,194	72,841	7,270	1,042	1,100	195	1,800	4,900	15,645	22,180	25,374	475,897
1905	67,460	162,626	197,749	13,242	1,375	2,137	10,289	2,940	4,925	17,084	18,004	23,927	521,758
1906	209,796	223,606	122,272	17,555	5,494	11,030	8,081	3,024	7,897	12,470	18,590	28,817	668,632
1907	153,946	246,269	107,787	17,832	3,806	5,627	9,524	1,751	8,194	22,359	12,810	14,034	603,939
1908	130,270	257,502	199,129	16,643	3,840	10,539	7,421	1,308	11,479	17,625	14,184	19,000	688,940
1909	170,573	263,012	225,164	17,033	6,786	7,131	8,965	3,525	17,297	25,432	26,750	39,299	810,967
1910	211,713	295,924	283,589	50,801	6,253	12,301	10,143	1,220	10,161	17,575	23,058	37,658	960,396
1911	235,830	380,822	271,667	36,584	18,886	21,887	5,849	6,822	9,531	12,287	8,576	11,589	1,020,330
1912	150,154	224,464	358,594	75,925	9,852	14,419	6,372	5,776	4,100	11,368	9,352	17,622	887,998
1913	170,624	320,715	307,315	46,407	16,731	14,354	10,230	5,835	7,415	18,162	20,029	23,977	961,794
1914	229,326	329,906	363,262	63,514	20,489	15,114	8,140	325	12,003	8,011	5,433	8,735	1,064,258
1915	57,206	92,490	287,620	105,778	8,089	9,064	2,842	1,440	5,694	17,346	23,743	38,650	649,962
1916	89,548	204,440	222,055	53,562	5,694	16,910	2,433	6,395	13,156	29,514	28,063	53,553	725,323
1917	211,063	263,187	178,364	36,997	20,183	21,951	8,271	11,450	6,989	35,149	64,269	117,291	975,164
1918	258,148	276,788	199,870	67,119	14,473	14,899	25,213	11,047	16,979	36,598	50,448	56,984	1,028,566
1919	209,841	205,286	255,889	127,183	22,053	16,358	3,449	500	6,740	13,140	85,134	132,754	1,078,327
1920	292,600	225,817	264,044	166,101	34,315	29,096	1,700	28,297	25,960	11,300	9,517	18,196	1,106,943
1921	98,283	98,562	286,912	74,620	9,561	7,119	1,061	500	3,400	7,850	6,788	7,425	602,081
1922	42,475	109,255	271,532	45,907	4,145	6,730	1,250	1,000	3,305	9,410	14,420	18,525	527,954
1923	180,905	200,934	207,131	31,090	6,640	4,085	1,090	3,900	2,465	10,850	10,150	33,800	693,040
1924	190,940	330,345	223,735	49,378	17,640	7,075	4,140	1,900	3,419	5,400	6,300	9,900	850,172
1925	72,283	210,253	423,810	114,009	9,128	5,535	1,450	1,200	6,633	5,717	6,850	15,150	872,018
1926	146,433	285,889	305,936	52,923	9,155	6,220	4,248	400	4,252	6,400	11,400	3,342	836,598
1927	90,783	162,628	292,880	98,180	25,004	8,817	2,594	6,508	2,422	9,550	10,032	22,113	731,511
1928	92,830	191,856	381,434	87,117	12,608	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 130. Percentage of Fertilizer Tags Sold Each Month, South Carolina, 1891 to 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1891	41.3	27.8	17.9	2.2	5.0	.....	0.4	0.2	.....	0.1	2.6	2.3
1892	14.4	48.8	24.4	1.1	.....	.....	.....	.....	0.5	0.4	3.6	6.8
1893	26.8	41.4	23.6	2.0	0.1	0.1	.....	.....	.....	0.7	2.5	2.8
1894	25.7	41.5	26.9	1.3	0.1	.....	.....	0.1	0.3	0.9	1.8	1.3
1895	12.0	9.7	55.2	12.6	0.2	.....	.....	.....	0.5	0.3	4.2	5.2
1896	31.2	40.6	15.8	1.7	0.1	0.1	.....	.....	0.8	0.5	3.0	6.1
1897	24.8	44.2	23.3	2.1	0.2	0.1	.....	0.1	0.2	0.7	2.1	2.2
1898	25.7	45.2	19.8	2.4	.....	.....	.....	0.2	0.3	1.1	1.5	3.8
1899	13.1	33.5	41.1	2.4	.....	.....	.....	0.1	0.2	0.7	4.7	4.2
1900	30.4	39.8	14.8	0.9	0.1	.....	.....	0.2	0.7	3.5	5.6	3.9
1901	31.0	37.6	22.9	0.6	.....	.....	.....	.....	0.2	2.2	2.3	3.0
1902	17.2	32.5	30.0	4.6	0.1	0.1	0.3	0.1	1.3	4.9	3.4	5.5
1903	27.6	36.1	27.4	0.6	0.1	0.1	0.1	0.3	0.7	1.7	2.3	2.9
1904	29.5	38.5	15.3	1.5	0.2	0.2	.....	0.4	1.0	3.3	4.7	5.3
1905	12.9	31.2	37.9	2.5	0.3	0.4	2.0	0.6	0.9	3.3	3.5	4.6
1906	31.4	33.4	18.3	2.6	0.8	1.6	1.2	0.5	1.2	1.9	2.8	4.3
1907	25.5	40.8	17.8	3.0	0.6	0.9	1.6	0.3	1.4	3.7	2.1	2.3
1908	18.9	37.4	28.9	2.4	0.6	1.5	1.1	0.2	1.7	2.6	2.1	2.8
1909	21.0	32.4	27.8	2.1	0.8	0.9	1.1	0.4	2.1	3.1	3.3	4.8
1910	22.0	30.8	29.5	5.3	0.7	1.3	1.1	0.1	1.1	1.8	2.4	3.9
1911	23.1	37.3	26.6	3.6	1.9	2.1	0.6	0.7	0.9	1.2	0.8	1.1
1912	16.9	25.3	40.4	8.6	1.1	1.6	0.7	0.7	0.5	1.3	1.1	2.0
1913	17.7	33.3	32.0	4.8	1.7	1.5	1.1	0.6	0.8	1.9	2.1	2.5
1914	21.5	31.0	34.1	6.0	1.9	1.4	0.8	.....	1.1	0.8	0.5	0.8
1915	8.8	14.2	44.3	16.3	1.2	1.4	0.4	0.2	0.9	2.7	3.7	5.9
1916	12.3	28.2	30.6	7.4	0.8	2.3	0.3	0.9	1.8	4.1	3.9	7.4
1917	21.6	27.0	18.3	3.8	2.1	2.3	0.8	1.2	0.7	3.6	6.6	12.0
1918	25.1	26.9	19.4	6.5	1.4	1.4	2.5	1.1	1.7	3.6	4.9	5.5
1919	19.5	19.0	23.7	11.8	2.0	1.5	0.3	0.1	0.6	1.2	7.9	12.3
1920	26.4	20.4	23.9	15.0	3.1	2.6	0.2	2.6	2.3	1.0	0.9	1.6
1921	16.3	16.4	47.7	12.4	1.6	1.2	0.2	0.1	0.6	1.3	1.1	1.2
1922	8.0	20.7	51.4	8.7	0.8	1.3	0.2	0.2	0.6	1.8	2.7	3.5
1923	26.1	29.0	29.9	4.5	1.0	0.6	0.2	0.6	0.4	1.6	1.5	4.9
1924	22.5	38.9	26.3	5.8	2.1	0.8	0.5	0.2	0.4	0.6	0.7	1.2
1925	8.3	24.1	48.6	13.1	1.0	0.6	0.2	0.1	0.8	0.7	0.8	1.7
1926	17.5	34.2	36.6	6.3	1.1	0.7	0.5	.....	0.5	0.8	1.4	0.4
1927	12.4	22.2	40.0	13.4	3.4	1.2	0.4	0.9	0.3	1.3	1.4	3.0

TABLE 131. MONTHLY SALES OF FERTILIZER TAGS, GEORGIA, 1912 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1912	209,535	315,048	360,572	148,311	10,365	6,808	1,525	136	7,590	14,866	9,435	2,274	1,086,465
1913	199,253	309,647	440,305	115,518	14,415	5,480	1,810	.....	2,050	25,973	12,346	4,250	1,131,047
1914	230,400	396,636	453,086	130,563	16,703	8,668	873	.....	650	2,973	1,287	6,210	1,248,049
1915	23,580	141,410	369,942	179,437	3,387	2,080	566	500	650	1,415	4,415	11,580	738,962
1916	88,287	231,473	252,863	87,608	3,637	4,200	260	.....	2,025	4,740	8,001	58,003	741,097
1917	222,143	236,640	212,763	51,435	11,987	3,582	1,050	100	2,750	9,092	19,788	103,280	874,610
1918	234,900	304,818	234,976	71,743	4,800	1,302	620	1,000	3,901	6,020	10,500	48,440	923,020
1919	189,086	201,423	324,129	141,653	8,800	3,430	1,205	100	435	3,400	24,658	92,600	990,919
1920	249,507	281,268	284,039	145,432	8,440	5,005	1,900	2,500	200	1,200	1,183	22,879	1,003,553
1921	86,848	83,184	297,660	57,256	1,588	970	50	.....	1,183	1,328	625	4,946	535,638
1922	31,157	118,347	285,193	76,639	2,230	550	235	143	1,750	2,053	650	2,600	521,547
1923	173,073	257,985	170,494	53,037	4,508	755	900	1,050	666	2,200	4,633	6,566	675,867
1924	108,426	198,907	238,946	102,273	19,585	1,972	1,342	900	850	2,284	1,814	1,660	678,959
1925	58,628	149,442	415,974	143,827	2,608	3,005	108	117	683	1,583	533	2,300	778,808
1926	85,433	261,012	327,011	75,493	12,404	1,183	983	.....	800	2,567	533	12,883	780,302
1927	44,983	185,178	334,932	113,697	7,247	1,250	617	1,181	2,220	5,989	2,766	12,788	712,848
1928	97,489	230,127	429,253	99,852	12,704	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 132. PERCENTAGE OF FERTILIZER TAGS SOLD EACH MONTH, GEORGIA, 1912 TO 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1912.....	19.3	29.0	33.2	13.7	1.0	0.6	0.1	.....	0.7	1.4	0.9	0.2
1913.....	17.6	27.4	38.9	10.2	1.3	0.5	0.2	.....	0.2	2.3	1.1	0.4
1914.....	18.5	31.8	36.3	10.5	1.3	0.7	0.1	.....	0.1	0.2	0.1	0.5
1915.....	3.2	19.1	50.1	24.3	0.5	0.3	0.1	0.1	0.1	0.2	0.6	1.6
1916.....	11.9	31.2	34.1	11.8	0.5	0.6	.....	.....	0.3	0.6	1.1	7.8
1917.....	25.4	27.1	24.3	5.9	1.4	0.4	0.1	.....	0.3	1.0	2.3	11.8
1918.....	25.4	33.0	25.5	7.8	0.5	0.1	.....	0.1	0.4	0.7	1.1	5.2
1919.....	19.1	20.3	32.7	14.3	0.9	0.3	0.1	.....	.....	0.3	2.5	9.3
1920.....	24.9	28.0	28.3	14.5	0.8	0.5	0.2	0.2	.....	0.1	0.1	2.3
1921.....	16.2	15.5	55.6	10.7	0.3	0.2	.....	.....	0.2	0.2	0.1	0.9
1922.....	6.0	22.7	54.7	14.7	0.4	0.1	.....	.....	0.3	0.4	0.1	0.5
1923.....	25.6	38.2	25.2	7.8	0.7	0.1	0.1	0.2	0.1	0.3	0.7	1.0
1924.....	16.0	29.3	35.2	15.1	2.9	0.3	0.2	0.1	0.1	0.3	0.3	0.2
1925.....	7.5	19.2	53.4	18.5	0.3	0.4	.....	.....	0.1	0.2	0.1	0.3
1926.....	10.9	33.5	41.9	9.7	1.6	0.2	0.1	.....	0.1	0.3	0.1	1.7
1927.....	6.3	26.0	47.0	15.9	1.0	0.2	0.1	0.2	0.3	0.8	0.4	1.8

TABLE 133. MONTHLY SALES OF FERTILIZER TAGS, ALABAMA, 1917 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1917	22,800	37,500	98,350	33,700	4,550	1,050	200	300	105	4,700	1,750	8,700	213,705
1918	42,450	76,100	110,100	38,200	5,800	500	1,400	.....	.....	4,150	4,000	6,100	288,800
1919	10,500	73,150	115,900	60,650	1,700	300	100	200	.....	4,350	4,000	6,150	276,950
1920	51,000	112,300	151,200	31,400	13,250	2,500	.....	.....	.....	6,700	550	3,000	371,900
1921	14,750	32,150	72,350	45,900	1,600	700	200	50	550	200	1,500	6,300	176,250
1922	12,250	38,300	153,250	76,900	2,100	600	650	350	500	1,550	6,150	4,800	297,400
1923	46,300	118,200	213,500	30,600	3,950	550	200	200	1,350	1,850	3,000	18,850	437,950
1924	56,750	137,750	170,300	74,700	5,400	300	350	550	900	800	2,300	5,200	455,300
1925	42,350	130,700	295,500	95,000	1,650	800	300	1,050	400	550	3,150	12,800	584,250
1926	78,450	190,546	279,801	54,058	4,301	1,055	50	1,050	850	2,700	300	2,200	615,361
1927	46,050	67,000	218,200	118,800	7,500	1,900	1,250	500	2,200	2,050	2,100	10,150	477,700
1928	68,250	153,100	356,000	88,600	5,450	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 134. PERCENTAGE OF FERTILIZER TAGS SOLD EACH MONTH, ALABAMA, 1917 TO 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1917	10.7	17.5	46.0	15.8	2.1	0.5	0.1	0.1	.....	2.2	0.8	4.1
1918	14.7	26.4	38.1	13.2	2.0	0.2	0.5	.....	.....	1.4	1.4	2.1
1919	3.8	26.4	41.8	21.9	0.6	0.1	.....	0.1	.....	1.6	1.4	2.2
1920	13.7	30.2	40.7	8.4	3.6	0.7	.....	.....	.....	1.8	0.1	0.8
1921	8.4	18.2	41.0	26.0	0.9	0.4	0.1	.....	0.3	0.1	0.9	3.6
1922	4.1	12.9	51.5	25.9	0.7	0.2	0.2	0.1	0.2	0.5	2.1	1.6
1923	10.6	27.0	48.7	6.9	0.9	0.1	.....	.....	0.3	0.4	0.7	4.3
1924	12.5	30.3	37.4	16.4	1.2	0.1	0.1	0.1	0.2	0.2	0.5	1.1
1925	7.2	22.4	50.6	16.3	0.3	0.1	.....	0.2	0.1	0.1	0.5	2.2
1926	12.7	31.0	45.5	18.8	0.7	0.2	.....	0.2	0.1	0.4	.....	0.4
1927	9.6	14.0	45.7	24.9	1.6	0.4	0.3	0.1	0.5	0.4	0.4	2.1

TABLE 135. MONTHLY SALES OF FERTILIZER TAGS, LOUISIANA, 1886 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1886	.....	.....	.....	.....	.....	.....	.....	.....	.....	202	.....	100	.....
1887	639	1,670	2,776	1,122	50	.....	.....	174	100	10	312	65	6,918
1888	1,115	2,509	1,884	1,585	619	.....	.....	.....	.....	300	200	1,500	9,712
1889	1,514	1,112	1,440	3,462	1,400	.....	.....	.....	.....	100	200	400	9,628
1890	2,606	3,396	2,105	2,313	.....	.....	.....	.....	170	.....	500	265	11,355
1891	1,625	2,020	2,685	2,681	1,201	.....	225	.....	540	.....	.....	300	11,277
1892	1,600	2,170	990	2,460	865	.....	.....	.....	15	15	21	4,000	12,136
1893	1,962	1,452	2,796	2,430	548	10	.....	.....	.....	.....	1,500	1,100	11,798
1894	2,785	2,065	1,123	970	323	.....	.....	.....	200	40	.....	400	7,906
1895	531	870	911	1,301	475	5	50	.....	.....	400	.....	610	5,153
1896	2,326	2,519	2,112	1,951	335	.....	.....	.....	75	300	500	352	10,470
1897	1,768	2,660	3,392	1,485	2,018	.....	.....	.....	12	200	512	1,200	13,247
1898	2,313	3,245	4,900	1,950	163	.....	12	.....	2,788	325	1,118	1,879	18,693
1899	6,660	2,777	6,111	625	1,700	.....	.....	.....	1,150	1,235	700	6,536	27,494
1900	5,837	6,517	5,294	2,284	2,457	.....	.....	.....	1,702	880	2,470	3,346	30,787
1901	11,417	12,045	8,825	4,464	2,734	.....	.....	70	1,723	825	1,321	5,905	49,329
1902	12,675	16,529	9,087	4,150	1,472	98	10	.....	1,681	1,265	1,328	10,572	58,867
1903	14,312	17,554	11,218	10,104	8,604	821	200	.....	6,044	1,550	1,300	5,800	77,507
1904	30,507	18,404	23,635	7,719	913	100	.....	.....	1,550	2,286	3,770	5,094	93,978
1905	24,962	12,520	28,852	10,033	4,538	285	.....	.....	1,017	5,275	2,729	2,350	92,561
1906	20,293	25,585	19,328	3,802	4,812	394	15	32	9,308	2,950	1,367	6,339	94,225
1907	22,825	27,594	24,704	6,871	240	253	.....	.....	4,708	3,110	505	590	91,400
1908	20,402	19,106	23,372	9,668	2,264	350	.....	.....	5,185	1,225	755	4,714	87,041
1909	20,787	20,921	22,292	6,205	1,505	50	50	177	6,423	1,773	868	8,038	89,089
1910	20,945	14,974	19,988	11,760	3,115	255	17	77	7,468	2,937	1,118	6,039	88,693
1911	24,119	16,781	23,123	7,966	1,340	.....	75	125	5,002	2,133	1,000	3,250	84,914
1912	14,565	24,254	20,068	7,520	4,745	2,031	150	900	4,614	1,975	1,269	3,326	85,417
1913	20,501	23,998	27,054	10,820	3,470	450	604	598	5,448	3,313	215	960	97,431
1914	22,730	20,663	25,466	7,213	2,639	863	261	864	13,725	505	320	1,065	96,314
1915	11,060	13,274	15,467	9,633	6,356	680	.....	300	8,610	3,051	650	3,057	72,138
1916	5,894	18,361	25,523	7,548	2,302	30	50	75	4,634	4,050	600	2,400	71,467
1917	17,918	19,830	24,550	12,551	2,553	265	25	955	4,020	2,600	5,500	10,300	101,067
1918	29,378	29,785	17,808	11,930	7,002	.....	.....	.....	1,850	800	13,650	1,705	113,908
1919	13,762	29,175	20,247	8,853	5,697	1,986	.....	.....	4,759	40	250	4,309	89,078
1920	21,750	29,731	27,935	12,955	3,388	.....	105	.....	13,550	650	.....	700	110,764
1921	8,208	13,103	5,044	5,300	500	50	15	.....	6,888	4,484	800	100	44,492
1922	7,416	14,000	18,219	10,715	2,040	1,492	150	150	4,960	5,720	4,087	6,100	75,049
1923	22,400	21,348	28,539	11,188	2,650	380	315	1,028	3,912	6,615	3,020	3,230	104,625
1924	28,888	39,325	28,643	8,996	4,710	245	1,013	140	3,144	1,700	1,350	5,962	124,116
1925	7,000	43,850	37,869	3,482	350	.....	.....	490	2,380	6,030	4,525	4,818	110,794
1926	16,475	49,940	26,834	3,395	426	100	250	877	6,641	8,350	300	750	114,338
1927	21,495	34,876	13,825	2,598	255	5	500	500	3,125	9,604	4,133	1,950	92,866
1928	21,236	43,389	41,733	6,782	628	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 136. PERCENTAGE OF FERTILIZER TAGS SOLD EACH MONTH, LOUISIANA, 1887 TO 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1887	9.2	24.1	40.1	16.2	0.7	.....	.....	2.5	1.4	0.1	4.5	0.9
1888	11.5	25.8	19.4	16.3	6.4	.....	.....	.....	.....	3.1	2.1	15.4
1889	15.7	11.5	15.0	36.0	14.5	.....	.....	.....	.....	1.0	2.1	4.2
1890	23.0	29.9	18.5	20.4	.....	.....	.....	.....	1.5	.....	4.4	2.3
1891	14.4	17.9	23.8	23.8	10.6	.....	2.0	.....	4.8	.....	.....	2.7
1892	13.2	17.9	8.2	20.3	7.1	.....	.....	.....	0.1	0.1	0.2	33.0
1893	16.6	12.3	23.7	20.6	4.6	0.1	.....	.....	.....	.....	12.7	9.3
1894	35.2	26.1	14.2	12.3	4.1	.....	.....	.....	2.5	0.5	.....	5.1
1895	10.3	16.9	17.7	25.2	9.2	0.1	1.0	.....	.....	7.8	.....	11.8
1896	22.2	24.1	20.2	18.6	3.2	.....	.....	.....	0.7	2.9	4.8	3.4
1897	13.3	20.1	25.6	11.2	15.2	.....	.....	.....	0.1	1.5	3.9	9.1
1898	12.4	17.4	26.2	10.4	0.9	.....	0.1	.....	14.9	1.7	6.0	10.1
1899	24.2	10.1	22.2	2.3	6.2	.....	.....	.....	4.2	4.5	2.5	23.8
1900	19.0	21.2	17.2	7.4	8.0	.....	.....	.....	5.5	2.9	8.0	10.9
1901	23.1	24.4	17.9	9.0	5.5	.....	.....	0.1	3.5	1.7	2.7	12.0
1902	21.5	28.1	15.4	7.0	2.5	0.2	.....	.....	2.9	2.1	2.2	18.0
1903	18.5	22.6	14.5	13.0	11.1	1.1	0.3	.....	7.8	2.0	1.7	7.5
1904	32.5	19.6	25.1	8.2	1.0	0.1	.....	.....	1.6	2.4	4.0	5.4
1905	27.0	13.5	31.2	10.8	4.9	0.3	.....	.....	1.1	5.7	2.9	2.5
1906	21.5	27.2	20.5	4.0	5.1	0.4	.....	.....	9.9	3.1	1.5	6.7
1907	25.0	30.2	27.0	7.5	0.3	0.3	.....	.....	5.2	3.4	0.6	0.6
1908	23.4	22.0	26.9	11.1	2.6	0.4	.....	.....	6.0	1.4	0.9	5.4
1909	23.3	23.5	25.0	7.0	1.7	0.1	0.1	0.2	7.2	2.0	1.0	9.0
1910	23.6	16.9	22.5	13.3	3.5	0.3	.....	0.1	8.4	3.3	1.3	6.8
1911	28.4	19.8	27.2	9.4	1.6	.....	0.1	0.1	5.9	2.5	1.2	3.8
1912	17.1	28.4	23.5	8.8	5.6	2.4	0.2	1.1	5.4	2.3	1.5	3.9
1913	21.0	24.6	27.8	11.1	3.6	0.5	0.6	0.6	5.6	3.4	0.2	1.0
1914	23.6	21.5	26.4	7.5	2.7	0.9	0.3	0.9	14.3	0.5	0.3	1.1
1915	15.3	18.4	21.4	13.4	8.8	0.9	.....	0.4	11.9	4.2	0.9	4.2
1916	8.2	25.7	35.7	10.6	3.2	.....	0.1	0.1	6.5	5.7	0.8	3.4
1917	17.7	19.6	24.3	12.4	2.5	0.3	.....	0.9	4.0	2.6	5.4	10.2
1918	25.8	26.1	15.6	10.5	6.1	.....	.....	.....	1.6	0.7	12.0	1.5
1919	15.4	32.8	22.7	10.0	6.4	2.2	.....	.....	5.3	.....	0.3	4.8
1920	19.6	26.8	25.2	11.7	3.1	.....	.....	.....	12.2	0.6	.....	0.6
1921	18.4	29.5	11.3	11.9	1.1	0.1	.....	.....	15.5	10.1	1.8	0.2
1922	9.9	18.7	24.3	14.3	2.7	2.0	0.2	0.2	6.6	7.6	5.4	8.1
1923	21.4	20.4	27.3	10.7	2.5	0.4	0.3	1.0	3.7	6.3	2.9	3.1
1924	23.3	31.7	23.1	7.2	3.8	0.2	0.8	0.1	2.5	1.4	1.1	4.8
1925	6.3	39.6	34.2	3.1	0.3	.....	.....	0.4	2.1	5.4	4.1	4.3
1926	14.4	43.7	23.5	3.0	0.4	0.1	0.2	0.8	5.8	7.3	0.3	0.7
1927	23.1	37.6	14.9	2.8	0.3	.....	0.5	0.5	3.4	10.3	4.5	2.1

TABLE 137. MONTHLY SALES OF FERTILIZER TAGS, TEXAS, 1911 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1911	.....	.....	.....	.....	.....	....	....	....	3,300	3,400	1,900	3,108	.....
1912	9,656	14,824	12,076	2,908	624	76	....	252	2,800	800	1,500	2,400	47,916
1913	13,724	20,952	22,932	9,880	304	100	100	132	2,500	868	780	1,624	73,896
1914	22,676	21,276	25,680	6,528	100	76	....	....	4,700	824	300	300	82,460
1915	3,264	6,624	4,820	1,200	48	52	48	76	2,739	882	650	1,450	21,853
1916	3,825	6,095	6,255	1,370	25	100	....	....	2,000	400	1,050	2,650	23,770
1917	7,925	10,678	11,710	3,206	510	5	100	120	1,930	1,495	9,885	12,190	59,754
1918	10,840	4,760	13,030	5,325	120	....	....	....	4,000	250	805	5,150	44,280
1919	14,950	13,670	8,850	2,450	120	50	8	250	1,600	500	750	8,100	51,298
1920	10,794	12,212	20,398	2,625	.....	....	....	....	5,750	100	200	201	52,280
1921	5,100	4,573	2,775	405	5	....	100	....	1,610	5,054	500	1,500	21,622
1922	4,725	5,260	11,862	2,909	300	121	150	325	2,260	1,600	350	4,050	33,912
1923	17,361	15,495	25,570	8,813	255	269	100	....	2,220	1,420	3,684	3,600	78,787
1924	27,315	32,155	39,571	17,750	500	....	....	....	2,550	1,750	1,600	4,600	127,791
1925	17,060	32,460	38,074	4,559	580	25	....	200	3,200	1,600	700	2,600	101,058
1926	21,720	47,120	35,400	10,475	850	275	600	50	2,050	3,000	180	3,430	125,150
1927	17,750	19,500	20,745	11,556	700	100	50	200	3,750	1,920	2,070	2,180	80,521
1928	19,650	27,450	57,800	27,816	1,680	....	....	....	.....	.....	.....	.....	.....

TABLE 138. PERCENTAGE OF FERTILIZER TAGS SOLD EACH MONTH, TEXAS, 1912 TO 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1912.....	20.2	30.9	25.2	6.1	1.3	0.2	.....	0.5	5.8	1.7	3.1	5.0
1913.....	18.6	28.4	31.0	13.4	0.4	0.1	0.1	0.2	3.4	1.2	1.1	2.2
1914.....	27.5	25.8	31.1	7.9	0.1	0.1	.....	.....	5.7	1.0	0.4	0.4
1915.....	14.9	30.3	22.0	5.5	0.2	0.2	0.2	0.3	12.5	4.0	3.0	6.6
1916.....	16.1	25.6	26.3	5.8	0.1	0.4	.....	.....	8.4	1.7	4.4	11.1
1917.....	13.3	17.9	19.6	5.4	0.9	.....	0.2	0.2	3.2	2.5	16.5	20.4
1918.....	24.5	10.7	29.4	12.0	0.3	.....	.....	.....	9.0	0.6	1.8	11.6
1919.....	29.1	26.6	17.3	4.8	0.2	0.1	.....	0.5	3.1	1.0	1.5	15.8
1920.....	20.6	23.4	39.0	5.0	.....	.....	.....	.....	11.0	0.2	0.4	0.4
1921.....	23.6	21.1	12.8	1.9	.....	.....	0.5	.....	7.4	23.4	2.3	6.9
1922.....	13.9	15.5	35.0	8.6	0.9	0.4	0.4	1.0	6.7	4.7	1.0	11.9
1923.....	22.0	19.7	32.5	11.2	0.3	0.3	0.1	.....	2.8	1.8	4.7	4.6
1924.....	21.4	25.2	31.0	13.9	0.4	.....	.....	.....	2.0	1.4	1.3	3.6
1925.....	16.9	32.1	37.7	4.5	0.6	.....	.....	0.2	3.2	1.6	0.7	2.6
1926.....	17.4	37.7	28.3	8.4	0.7	0.2	0.5	.....	1.6	2.4	0.1	2.7
1927.....	22.0	24.2	25.8	14.4	0.9	0.1	0.1	0.2	4.7	2.4	2.6	2.7

TABLE 139. MONTHLY SALES OF FERTILIZER TAGS, MISSOURI, 1919 TO 1928

(Short tons of fertilizer)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1919	8,450	58,384	854	2,059	144	6,332	13,772	31,456	20,328	2,323	27	.....	144,129
1920	7,693	747	5,852	1,724	.....	2,702	20,742	28,865	8,294	9,475	5,426	1,219	92,739
1921	3,208	2,599	1,897	58	16	519	3,238	18,012	21,778	174	5	.....	51,504
1922	695	2,908	3,614	125	580	30	13,000	9,229	19,095	675	57	13	50,021
1923	5,969	3,996	2,490	961	1,850	156	10,875	6,262	18,169	722	60	85	51,595
1924	2,016	6,432	2,662	2,760	357	80	5,562	9,527	16,600	1,092	.....	32	47,120
1925	2,380	3,882	8,095	2,125	640	15	1,000	15,395	28,748	1,867	52	.....	64,199
1926	5,440	2,158	5,281	1,908	899	36	5,150	10,705	25,000	280	3	31	56,891
1927	2,793	3,235	5,535	708	931	227	3,648	13,522	25,218	208	9	66	56,100
1928	2,612	5,261	4,030	5,292	2,038	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 140. PERCENTAGE OF FERTILIZER TAGS SOLD EACH MONTH, MISSOURI, 1919 TO 1927

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	5.9	40.5	0.6	1.4	0.1	4.4	9.6	21.8	14.1	1.6	.....	.....
1920	8.3	0.8	6.3	1.9	.....	2.9	22.4	31.1	8.9	10.2	5.9	1.3
1921	6.2	5.0	3.7	0.1	.....	1.0	6.3	35.0	42.3	0.3	.....	.....
1922	1.4	5.8	7.2	0.2	1.2	.....	26.0	18.5	38.2	1.3	0.1	.....
1923	11.6	7.7	4.8	1.9	3.6	0.3	21.1	12.1	35.2	1.4	0.1	0.2
1924	4.3	13.7	5.6	5.9	0.8	0.2	11.8	20.2	35.2	2.3	.....	0.1
1925	3.7	6.0	12.6	3.3	1.0	.....	1.6	24.0	44.8	2.9	0.1	.....
1926	9.6	3.8	9.3	3.4	1.6	0.1	9.1	18.8	43.9	0.5	.....	0.1
1927	5.0	5.8	9.9	1.3	1.7	0.4	6.5	24.1	45.0	0.4	.....	0.1

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